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TROPICAL DISEASES BULLETIN

VOL. 39.] 1942. [No. 9.

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IMPERIAL MYCOLOGICAL INSTITUTE
3 OCT 1942

Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.

Price 2/6 Net.] *Entered as Second Class Matter in the U.S.A. Post.* [Annual Subscription 21/-.

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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN.

Vol. 39.] 1942. [No. 9.

SUMMARY OF RECENT ABSTRACTS.*

VII. HELMINTHIASIS.

[*Continued from* p. 513.]

Nematodes.

Ankylostomiasis, Strongyloides and Ascaris Infections.—OTTO *et al.* (p. 473) consider that zinc sulphate solution of specific gravity 1·18 is as efficient as saturated sodium chloride solution of specific gravity 1·2 in concentrating hookworm eggs, but note that the straining of faecal material through cheesecloth reduces the efficiency of the method. In this they confirm LANE's objection to screening. Probably the most efficient method of using the zinc sulphate solution would be by combining it with centrifugal floatation according to Lane's procedure.

KELLER *et al.* (p. 474) have made a hookworm survey in the Southern United States and compare their results with those of a survey made in 1910–1914. They calculate that a reduction of 68 per cent. in incidence has taken place, but the infection is still widespread, especially in the coastal plain and sandy soil areas of each State. The greatest prevalence was in persons aged 5 to 19, with the peak at age 15–19. About one-quarter of the infected persons had infections severe enough to produce symptoms. Negroes suffer less than whites in the same areas. The incidence in negroes was only one-quarter of that found in whites, and the average intensity only half that of the whites. In comment LANE gives his opinion that the method of stool examination employed at the second survey (Stoll and Hausheer) was insufficient to disclose all infections. In the first survey faecal smear was used. In another hookworm survey, BROWN and OTTO (p. 476) note that the D.C.F. technique, with a saturated solution of common salt, was twice as effective as the Stoll method in detecting infection. They investigated the question whether reticulocytosis due to hookworm infection predisposed to malaria, since it is known that *Plasmodium vivax* is found much more frequently in reticulocytes than in normal red cells. No such predisposition could be detected, but it is concluded that hookworm infection may well be a contributing factor in the illness of malaria, and that either infection may predispose to other diseases even if neither is enough to produce marked anaemia.

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1941, Vol. 38. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

OHAMA (p. 474) reports extensive, but fairly light, infection of children in part of Formosa.

BONNE and LIE KIAN JOE (p. 475) report four cases in which *Ancylostoma duodenale* were found within haemorrhagic patches inside the wall of the small or large intestine. It is noted that although *A. duodenale* were present in the intestinal contents they were not nearly so numerous as *N. americanus*.

CORT and OTTO (p. 476) discuss immunity in hookworm infection. There seems to be evidence that immunity is acquired, but that it does not become absolute, and that it is subject to complicating factors of age, diet and anaemia. The immunity is general, not local, is caused by specific antibodies and requires the continuous presence of worms for its maintenance. They suggest that severe hookworm disease in man is commonly due to the presence of the worms in hosts so undernourished or otherwise debilitated that the immunity factor is not wholly effective.

MAPLESTONE and MUKERJI (p. 114) discuss the value of tetrachlorethylene as an anthelmintic in hookworm infection, laying stress upon the safety of their standard dose (4 cc. for an adult), the low cost and the ease of administration. It is their conclusion, as a result of a comparative test, that tetrachlorethylene is a better drug than thymol (given in doses calculated to the nearest grain on the basis of 60 grains for 150 pounds of body weight) on the grounds of lower toxicity, lower cost, greater ease of dispensing, less time taken in completing a treatment, and greater efficiency. The body weight of the Indians treated was usually considerably below 150 pounds. In comment LANE states his opinion that thymol is still the safest of efficient anthelmintics and that it has been given in the full dose of 60 grains to 50,000 Indians, regardless of body weight, and without anxiety. He urges further re-examination of the subject.

HAHN *et al.* (p. 116) point out that in dogs anaemic owing to blood loss, absorbed iron is converted into haemoglobin with great rapidity, within two to three days if the dose of iron administered is very small, within four to seven days if it is larger. As the iron intake is increased, the proportion absorbed falls rapidly, but as LANE points out in comment, the total amount absorbed (as opposed to the percentage of the amount given) increases, though much more slowly. PAYNE and PAYNE (p. 477) have investigated the effect upon hookworm anaemia of: (1) The administration of iron alone. This was followed by rapid increase in haemoglobin, but this gradually fell thereafter unless the worms were removed. (2) The administration of an anthelmintic alone. This was followed by a slow rise in haemoglobin, which reached a satisfactory level in one to two years. (3) The administration of an anthelmintic supplemented by a small amount of iron. This gave the most satisfactory results in the maintenance of the haemoglobin level.

FAUST and DE GROAT (p. 118) report on a fatal case of Strongyloides infection in which was seen the relatively heavy invasion, of the deeper layers of the bowel wall and liver, by filariform larvae derived from mother worms situated in the overlying mucosa. They note that self infection may result from: (1) Perianal invasion by filariform larvae, (2) Invasion by filariform larvae of the mucosa of the bowel at lower levels, or (3) at the level of origin of the larvae. (4) Massive penetration of the muscularis mucosae by unchanged rhabditiform larvae. Self infection may be reduced by measures of personal hygiene,

by adequate nutrition and haemopoietic stimuli and by treatment. [Elsewhere Faust has suggested the following treatment :—Medicinal gentian violet given before meals in enteric-coated tablets, 1 grain (0·06 gm.) three times daily until 50 grains (3·3 gm.) have been taken. The dosage is the same for children as for adults. For refractory cases 25 cc. of a 1 per cent. aqueous solution of the dye may be introduced by intubation into the duodenum with good results. See Stitt's *Tropical Diseases*, 6th edition, 1942, Vol. 2, p. 1286.]

GALLIARD (p. 117) reports that in Tonking human infection with Strongyloides occurs but is not detected so often as hookworm infection. He discusses the possible agencies which may tend to limit the transmission of Strongyloides infection in spite of the apparently greater chance which this worm possesses by virtue of the multiplication of infective forms possible to one parasitic larva during the free-living cycle. He inclines to the view that, particularly on transfer from one host species to another, there is a great loss of viability, and points out that in the dog there is extensive degeneration and digestion of the young as they pass down the intestine, so that though abundant in the duodenum they may be absent from the stools. He notes that in 64 persons negative on direct smear, faecal culture showed 43 to have hookworm and six to have Strongyloides infection, but present methods, in view of the probable digestion of larvae in the intestine, are ineffective in diagnosis. In comment LANE suggests the use of the duodenal sound for Strongyloides and of a floatation method for hookworm diagnosis. GALLIARD (p. 117) states that in Tonking Strongyloides infection in the dog and the cat is rare, though pups are easily infected with human strains. Worms from human sources, which have both direct and indirect cycles, show only the indirect cycle in the dog.

BERGER and ASENJO (p. 119) note that crystalline papain digests *Ascaris lumbricoides in vitro* ; in 0·11 per cent. solution in phosphate-phthalate buffer of *p*H 5, papain completely disintegrated the worms in 16 hours.

PENEY (p. 119) reports a case in which symptoms of meningitis, together with turbid cerebrospinal fluid containing lymphocytes but no organisms, were attributed to intestinal infection with Ascaris. Cure coincided with the administration of santonin [but it is noteworthy that the raised temperature had fallen considerably before treatment was instituted].

Filariasis.—KOBAYASHI (p. 520) gives a description of the organization of the microfilariae of *W. bancrofti.*

Since more microfilariae were always found in the blood than in puncture material from the sternum in a number of cases examined by day or night, NAPIER *et al.* (p. 521) conclude that there is no evidence that microfilariae shelter in the bone marrow by day or that they are destroyed in the marrow. There is no evidence of bone marrow change in this infection.

By injecting blood which contained microfilariae of *W. bancrofti* into the blood stream of uninfected persons or of various animals, HAWKING (p. 147) has attempted to determine if the periodicity of the embryos depends on the presence of the adult worms. The results were not conclusive. It was repeatedly noticed that most of the microfilariae disappeared promptly from the blood.

MENON and RAMAMURTI (p. 519) have studied *in vitro* the process of exsheathing of microfilariae of *W. bancrofti* from man. Activity

of the microfilariae was good in citrated blood, but there was no development or growth. Unsheathing was not caused by peptic digestion or alteration of physical characters of the medium, but took place when the microfilariae penetrated masses of fibrin and leucocytes, apparently by mechanical means.

KOBAYASI (p. 149) describes in detail the development of larvae of *W. bancrofti* in the body of *Culex fatigans*. The findings cannot satisfactorily be abstracted.

HAWKING (p. 146) gives an account of the distribution of filariasis in Tanganyika Territory. Infection by *W. bancrofti* is found along the coast and in the region of the Great Lakes. Infection by *A. perstans* is largely found to the west and north of Lake Victoria, and is probably limited as a result of climatic conditions which govern the distribution of the vectors. Yet he notes that at Mwanza, where *W. bancrofti* is common, *A. perstans* is not found, while the reverse holds good at Kampala, and points out that the climates of these two lakeside areas are very similar. *Culex fatigans* was found to be infected with *W. bancrofti* in high proportion at Dar-es-Salaam on the coast.

SOETRISNO (p. 518) gives a map of the distribution of filariasis on the island of Boeroe, Netherlands East Indies, where 51·8 per cent. of the population were found to be infected, the filaria responsible being, apparently, *W. bancrofti*.

HU (p. 148) in Shanghai found infective larvae of *W. bancrofti* in 21 of 29 *Culex vorax* fed upon a heavily infected patient, but noted that extensive chitinization of the infective larvae occurred, which may affect adversely the potential rôle of this species in transmission. He (p. 149) found that only one of 90 *C. bitaeniorhynchus* similarly fed harboured infective larvae, but reports (p. 149) that 20·9 per cent. of *Anopheles hyrcanus* var. *sinensis*, treated in the same way, contained infective larvae. The same author (p. 520) states that in Shanghai *Culex pallidothorax* was found to be susceptible to experimental infection with *W. bancrofti*, but as it is not a common household mosquito it is probably not an important carrier. YAO *et al.* (p. 150) have shown that larvae of *W. bancrofti* may develop within sandflies (*P. chinensis* and others) to the post-sausage forms in the thoracic muscles.

HAWKING (p. 151) has tested the filaricidal action of a number of drugs. None had any action *in vivo*, and of 35 tested *in vitro* only certain arsenicals and tartar emetic were effective, and these only in concentrations impossible in the blood of living animals. The essential disadvantage of *in vitro* tests is that many drugs do not exhibit *in vitro* the specific activities they possess *in vivo*. Chemotherapeutic research in filariasis therefore requires the use of some small filaria-carrying animal.

RAO and MAPLESTONE (p. 152) describe the adult male and female of *Microfilaria malayi*, and propose to name this worm *Wuchereria malayi* in accordance with the specific name given to the embryo by Brug.

RAO (p. 518) reports a focus of *W. malayi* infection in the Central Provinces, India. Species of Mansonioides breed in most of the big tanks, all of which are covered by Pistia. In Galle, Ceylon, about 10 per cent. of the population harbour filariae, and DASSANAYAKE (p. 152) reports that of the microfilariae found, about half were *W. bancrofti* and half *W. malayi*. *Mansonia uniformis* is prevalent in the *W. malayi* districts and *Culex fatigans* in the *W. bancrofti* areas.

HODGKIN and POYNTON (p. 153) state that in the Federated Malay States the essential factor for transmission of *W. malayi* is the presence of large numbers of Mansonia, especially *M. longipalpis*, and that this in turn depends upon the proximity of extensive, uncultivated, fresh water swamps within which the larvae obtain their water supply from the roots of trees. *M. longipalpis* is easily infected and in a series fed upon carriers of microfilariae the proportion infected was 96·62 per cent. Blood films from inhabitants of several districts showed microfilariae in 14 to over 50 per cent. There are reports that the injection of certain drugs into enlarged glands and the surrounding muscle is effective in reducing febrile attacks, and thus in retarding the development of elephantiasis. Such drugs are 1·0 cc. of 1 per cent. mercury cyanide, or anthiomaline, and favourable effects have been found with intravenous Mapharside, but the authors stress the need for caution in appraisement of results.

KARIADI (p. 520) states that in Martapoera, Netherlands East Indies, *Anopheles hyrcanus 'X'* is a carrier of *W. malayi*, though probably not so important as other mosquitoes.

DE SAVITSCH (p. 521) describes the surgical treatment of elephantiasis of the scrotum and penis.

ANDERSON and LEHUCHER (p. 155) report a case of onchocerciasis from La Goulette in Tunisia. HAWKING (p. 522) has found onchocerciasis in a small proportion of the inhabitants of S.W. Tanganyika Territory. MCMAHON (p. 154) reports an incidence of 51 per cent. of onchocerciasis in the S. Kavirondo district of Kenya. The adult rate is higher than that in children, but children may be infected at the age of four or earlier. Adult Simulium were collected in the riverine bush, and pupae from the rivers; practically all were *S. neavei*, and of 557 flies dissected, 49 were infected. Highest infectivity rates were found in lowest fly densities because in the latter there was more contact between fly and man. On the other hand, human infection is greatest where the flies are most abundant; as a rule flies are reluctant to leave the riverine bush, but dense thicket is not attractive to them. No adult flies were found inside human habitations. HARRIS (p. 522) gives details of the clinical findings in a focus of onchocerciasis in the S. Kavirondo district of Kenya and notes that treatment by intravenous antimony sodium tartrate in persons from whom a nodule has been excised was followed by disappearance of microfilariae from the skin blood, and by a fall in the proportion of eosinophils in the blood.

MOHR and LIPPELT (p. 518) have tested the complement fixation reaction in various helminthic infections, using as antigen a preparation from *Contortospiculum rheae*, a filaria of the S. American ostrich. The test was strongly positive in a few cases of *A. perstans* and *L. loa* infections, but negative in others, and positive in certain persons from places where filariasis is endemic. It was also positive in a few persons with hookworm or *S. mansoni* infections, in whom microfilariae were not found in the blood.

STEFANOPOULO and DANIAUD (p. 156) report that in guinea worm infections, the complement fixation reaction and the intradermal test, in both of which an antigen prepared from *Dirofilaria immitis* was used, were positive for some months after cure.

Enterobius and Trichinella infections.—SAWITZ (p. 156) quotes figures of his own investigations which show that a single NIH swab is much more efficient in the detection of Enterobius eggs than

centrifugal floatation with either brine or zinc sulphate solution. Additional swabs increase the efficiency of the method.

SAWITZ *et al.* (p. 523), in a study of the epidemiology of Enterobius infection, conclude that in children who sleep in large dormitories the infection is twice as common as in those in small rooms, that it is not lessened by keeping the house clean and that it has no relation to expenditure on food or maintenance. They consider that infection is passed on by direct contact, but in comment LANE points out that air-carriage appears to fit all the facts. Eggs were found not only on clothes but also on ledges of pillars, windows and doors.

BROWN *et al.* (p. 523) found Enterobius infection in white boys in N. Carolina, but not in negroes, though the hygienic habits of the latter are such that a high rate of infection might have been expected. CRAM (p. 524), however, found similar incidence in white and negro school-children, but notes that in the whites the rate was much lower than that found in other comparable groups; these children were exclusively Jewish. In general the incidence in negroes has been much less than in whites.

D'ANTONI and SAWITZ (p. 156) show that in certain children's institutions in New Orleans the enforcement of rigid hygienic measures failed to reduce the incidence of Enterobius infection. Treatment with gentian violet was given, and resulted in a cure rate of 90 per cent. The dosage varied from 0·5 to 1 grain three times a day for 5–8 days or longer, with repetition of the short courses, and the drug was given in half-grain tablets of the kind which is claimed to dissolve in the caecum. Vomiting was common but did not immediately follow the actual dosing. MILLER *et al.* (p. 526) obtained cure in 90 per cent. of children treated with gentian violet. The drug was given each day for 10 days, in children aged six to nine, two 3/20th grain tablets three times a day, and in children aged 10 to 13, one ½ grain tablet three times a day. Vomiting was not common.

MANSON-BAHR (p. 516) writes of the value of phenothiazine in the treatment of Ascaris and Enterobius infections. [Later work by other authors, however, has indicated that this drug may be dangerous.]

CATRON (p. 157) reports Trichinella infection found in 14·7 per cent. of routine autopsies at Ann Arbour, Michigan. Diagnosis was made after digestion of 50 gm. of diaphragm by pepsin and hydrochloric acid. LYSTER (p. 158) states that commercial papain in normal saline is satisfactory for digesting trichinous meat. Papain extracts of larvae are as efficient as pepsin extracts in skin tests and precipitin reactions.

SAWYER *et al.* (p. 527) note that the clinical picture in trichiniasis may be misleading. They quote a case in which there was swelling of the eyelids, high fever with rigor, and eosinophilia of 6 per cent.

ANDES *et al.* (p. 158) report that tetrachlorethylene administered to eight persons, in whom the diagnosis of Trichinella infection had been made within three days of the onset of symptoms, caused complete and immediate recovery. The most common symptoms were malaise, abdominal discomfort, fever, headache and oedema round the eyes.

OLIVER-GONZÁLEZ (p. 528) has investigated the action of immune serum on the larvae and adults of *Trichinella spiralis*. In all the experiments it was found that precipitate formed in large masses

around the mouth of the larvae, and was associated with immobilization, disintegration and death of many of them. Precipitates were formed around the mouth, anus and vulva of the adults. The time at which the precipitates appear varies according to the degree of immunization; inactivated serum is as effective as unheated serum. Serum from rabbits immunized with saline suspensions of powdered larvae was apparently lethal to more than half the larvae exposed, but had no effect on adults. MAUSS (p. 528) describes experiments which indicate that immunity to infection with *Trichinella spiralis* is transmitted from infected rodents to their young. In hamsters this immunity was lost in about three weeks after birth, and examination of the young animals failed to reveal actual infection, so that it is concluded that the resistance shown by the young is not due to active immunity. The same author (p. 528) shows that the infectivity of larvae is much reduced after exposure to immune serum. A similar reduction is found after exposure to normal saline, but the addition of normal serum to the saline renders it largely incapable of reducing infectivity. McCOY (p. 529) shows that in immunized rats to which are administered living *T. spiralis* larvae, there is rapid development of diarrhoea with the elimination of most of the larvae within 18 hours. The eliminated larvae are alive, and as there is no sign of abnormal cellular reaction in the intestinal wall, it appears that increased secretion of mucus and increased intestinal peristalsis are the chief factors in the expulsion of the larvae. *Charles Wilcocks.*

RABIES.

A REVIEW OF RECENT ARTICLES. XXXVII.*

i. Virus.

Direct *in vitro* cultivation of street virus has been reported by PLOTZ and REAGAN[1]. The medium was chick-embryo brain tissue in monkey serum Tyrode. The strain of street virus was obtained from a case of human rabies, and it has been successfully cultivated through eleven transplants. Another strain from a rabid dog has similarly been cultivated through nine transplants. Twenty-four hours after transplantation "the plasma clot was found floating on the surface of the liquid medium, and sections of the clot showed proliferating cells in contrast to the non-proliferating cells which exist in the suspended cell medium." These proliferating cells provide a great yield of virus, and experiments are being carried out to determine whether these cultures can be employed as a vaccine.

Two cases of human rabies which exhibited symptoms of meningitic type are reported by DURAND[2]. In one the incubation period was

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* For the thirty-sixth of this series see this *Bulletin*, Vol. 39, p. 79.

[1] PLOTZ (Harry) & REAGAN (Reginald). In Vitro Cultivation of the Street Virus of Rabies.—*Science.* 1942. Jan. 23. Vol. 95. No. 2456. pp. 102–104. [10 refs.]

[2] DURAND (Paul). Deux cas de rage humaine à forme méningée; caractères particuliers du virus; remarques sur les réactions méningées au cours de la rage animale, naturelle ou expérimentale.—*Arch. Inst. Pasteur de Tunis.* 1941. June. Vol. 30. No. 1–2. pp. 55–76.

12 days, and in the other, though there was history of frequent contact with a dog, there was no indication that the patient had been bitten. In both cases post-mortem examination revealed marked meningeal congestion. The viruses obtained from the two cases were found to be identical, and were exhaustively examined by inoculation into rabbits, guineapigs, dogs, cats, rats, an ass, a sheep, a cow, a pig, and hens and pigeons. Filtration experiments were also carried out, and the resistancies of the viruses to low temperatures and to glycerine were determined. In addition cross-immunity tests with strains of rabies virus were carried out. In all respects the viruses behaved as rabies virus.

ii. Diagnosis.

The diagnosis of rabies is discussed by STOVALL and PESSIN[3]. In their experience the paraffin section is more satisfactory than the smear, and the delay in diagnosis occasioned is insignificant. They employ the eosin-methylene blue method of staining and draw attention to the advantage of keeping the solutions at a low *p*H.

Statistics relating to the correlation between inoculation of mice and microscopical examination of smears stained by SELLERS' stain (*Amer. Jl. Public Health*, 1927, Vol. 17, p. 1080) are given by DAMON and SELLERS[4]. An average of about 12 per cent. of specimens reported as microscopically negative were positive by the animal test. The percentage of microscopically positive specimens which gave a negative result on mouse inoculation was of the order of two to four.

iii. Methods of Treatment and Statistics.

The vaccinal properties of the clear supernatant obtained by isoelectric precipitation of 10 or 20 per cent. suspensions of sheep brain fixed virus (thereafter incubated at 37°C. for 24 hours) have been examined by VEERARAGHAVAN[5]. The buffer solution employed was the glycine-acetate-phosphate system of NORTHROP and DE KRUIF (*Jl. Gen. Physiol.*, 1922, Vol. 4, pp. 639–654). Of 70 untreated guineapigs tested by inoculation of street virus into the deep muscles of the neck, 58 died of rabies. Of 60 treated with 5 per cent. whole vaccine (Semple) 20 died; whilst of 60 treated with the clear supernatant 23 died. Thus the clear supernatant has approximately the same immunizing value as the ordinary Semple vaccine. The nerve tissue in the precipitate had relatively little immunizing value.

In the United States of America antirabic vaccines killed by phenol or chloroform are prepared commercially. A study of the potency of some of these, and of the consistency of samples prepared by the same firm, is thus a matter of importance. WYCKOFF and TESAR[6] have studied a large number of these, using both homologous and heterologous strains of challenge virus as a test dose. It appears that batches

[3] STOVALL (W. D.) & PESSIN (S. B.). Problems in the Laboratory Diagnosis of Rabies.—*Amer. Jl. Public Health.* 1942. Feb. Vol. 32. No. 2. pp. 171–175.

[4] DAMON (S. R.) & SELLERS (T. F.). A Note on the Probability of Error in the Diagnosis of Rabies by Microscopic Search for Negri Bodies.—*Jl. Lab. & Clin. Med.* 1941. Oct. Vol. 27. No. 1. pp. 71–74.

[5] VEERARAGHAVAN (N.). Elimination of Excess Nerve Tissue from Antirabic Vaccine.—*Indian Jl. Med. Res.* 1941. Apr. Vol. 29. No. 2. pp. 303–310.

[6] WYCKOFF (Ralph W. G.) & TESAR (Walter C.). The Potencies of Commercial Antirabic Vaccines.—*Jl. Immunology.* 1941. Mar. Vol. 40. No. 3. pp. 383–390.

from the same maker differ considerably, as also do those from different manufacturers. Their results also show that testing by fixed virus "will serve to eliminate the worthless lots, and give an approximate indication of their effectiveness against field strains of virus."

In a general article on rabies, MOORE[7] quotes certain statistics from New York City. During the period 1930–39, 598 persons, bitten by dogs which were proved to be rabid, received treatment. Of these, five contracted the disease. "There were 15 persons who did not receive antirabies treatment following a bite proved to be by a rabid dog. Of the 15 two died, or a mortality of 13·3 per cent."

Of 651 persons treated at the Pasteur Institute at Tunis,[8] during the year 1939, two died of rabies, one on the 29th and one on the 34th day after commencement of treatment. No cases exhibiting post-vaccinal sequelae were observed.

iv. Paralytic accidents.

A case of paraplegia following treatment by Fermi's vaccine is described by TYNDEL.[9] The patient had been an epileptic from childhood. Symptoms of paraplegia commenced 15 days after the beginning of treatment, and by the 24th day had become general. Rapid recovery followed. The patient again came under observation some seven months later, when it appeared that the symptoms of the old nervous lesion were considerably alleviated.

v. Rabies in animals.

JOHNSON and LEACH[10] have repeated their experiments on the protection of dogs by single doses of chloroform-treated vaccine containing 33·3 per cent. of brain material [this *Bulletin*, 1941, Vol. 38, pp. 164 and 496]. The experiments involved the use of 571 dogs, of which 297 were treated and 274 served as controls. The data, which are too lengthy to be recapitulated here, are carefully set out, and the statistical significance of the result is given in each case. This second experiment bears out the conclusions previously arrived at—that the chloroform vaccine as administered produced a high degree of immunity. No significant statistical difference between phenol and chloroform vaccine, when the brain material was in the same concentration, was observed. The antigenicity of chloroform vaccine was reduced by freezing and by drying *in vacuo*.

BALOZET[11] reports, as in previous years, on the results of vaccination of animals in Tunisia. During the year 1939, 204 prophylactic doses, 235 revaccinations, and nine curative doses were administered. The service has been in operation since 1931, and throughout the whole period 3,277 dogs received a prophylactic dose, and 1,274 were revaccinated. Amongst these no case of rabies has occurred. Of 56 dogs

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[7] MOORE (S. W.). Rabies.—*Amer. Jl. Surgery.* 1941. Aug. Vol. 53. No. 2. pp. 306–313. [10 refs.]

[8] ANDERSON (Ch.). Service antirabique.—*Arch. Inst. Pasteur de Tunis.* 1940. Sept. Vol. 29. No. 2 & 3. pp. 326–342.

[9] TYNDEL (Milo). Zur Frage der Paraplegien nach antirabischen Vakzinekuren.—*Med. Klin.* 1941. Nov. 21. Vol. 37. No. 47. pp. 1177–1178.

[10] JOHNSON (Harald N.) & LEACH (Charles N.). Studies on the Single Injection Method of Canine Rabies Vaccination.—*Amer. Jl. Public Health.* 1942. Feb. Vol. 32. No. 2. pp. 176–180.

[11] BALOZET (Lucien). La vaccination antirabique des animaux en Tunisie du 1er janvier au 31 décembre 1939.—*Arch. Inst. Pasteur de Tunis.* 1940. Sept. Vol. 29. No. 2 & 3. pp. 343–346.

which received curative treatment none developed rabies, of 46 equidae 1 died, and of 35 ruminants 4 contracted the disease. Similarly[12] in 1940, 335 dogs received a prophylactic dose, 103 were revaccinated, and 23 received curative treatment. Amongst these no case of rabies occurred. *A. G. McKendrick.*

OTTEN-VAN STOCKUM (Maria J.). **Rabies Researches.**—*Meded. Dienst d. Volksgesondheid in Nederl.-Indië.* 1941. Vol. 30. No. 3/4. pp. 111–157. [18 refs.]

This is an English version of the paper reviewed in this *Bulletin*, 1941, Vol. 38, p. 498.

MALARIA.

PALESTINE: DEPARTMENT OF HEALTH. **A Review of the Control of Malaria in Palestine (1918–1941).**—40 pp. With 5 maps. Jerusalem: Govt. Printing Press. [150 Mils.]

The control of malaria in Palestine during the 20 years between the two world wars was so remarkable an achievement that this very complete account of that work merits an honoured place in malaria literature. The political unrest that marked the years 1938 and 1939 and the subsequent arrival of very large numbers of susceptible military personnel were a severe test of the efficiency of the malaria control measures employed; they stood the test. Now the Palestine Department of Health is organizing courses of malaria instruction for military medical personnel as part of its army cooperation work, this report should be of great interest to participants in such courses.

The population of Palestine which in 1922 was 649,000 had increased by 1940 to 1,478,000, of whom 881,000 were Moslems and 464,000 Jews. The urban population forms 43 per cent. of the whole. The great majority of the rural population consists of Arabs living in villages on sites that have been occupied for centuries, and which were determined by proximity to spring, well, or rock-cut cistern. The standard of living and nutrition of the Arab population is low; that of the Jews is considerably higher. Some 84,000 nomadic Bedouin and ordinary shepherds create malarial hazards. The migration of flocks in seasons of small rainfall, notably to the Jordan valley, is still a factor of importance in the epidemiology of malaria.

The physiography and climatic conditions are diverse for so small a country. Sand-dunes edge the flat fertile coastal plain and impede the run-off of water; marshes and pools result. The central hills are limestone, covered with scanty soil, dry and barren. Winter rains erode holes in stream beds and seepages occur at foot-hills in the form of springs. The common water supply is from rock-cut rain-water cisterns. Swamps and seepages are common along the whole length of the Jordan Valley; this has always been one of the most malarious areas of Palestine and the Lake Huleh marshes still have an evil reputation. Late and heavy spring rains favour malaria throughout the country.

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[12] BALOZET (Lucien). La vaccination antirabique des animaux en Tunisie du 1er janvier au 31 décembre 1940.—*Arch. Inst. Pasteur de Tunis.* 1941. Dec. Vol. 30. No. 3–4. pp. 322–325.

Nine species of Anopheles are found in Palestine, *A. bifurcatus*, *A. elutus*, *A. superpictus*, *A. sergenti*, *A. hyrcanus* var. *sinensis*, *A. algeriensis*, *A. multicolor*, *A. pharoensis*, and *A. mauritianus*.

The last three are rare and unimportant from the point of view of malaria. *A. bifurcatus*, a domestic species breeding in wells and cisterns, was formerly common in all towns and villages in all parts of the country throughout the year; it was responsible for nearly all urban malaria. Piped water supplies, and the closing, mosquito-proofing or oiling of wells and cisterns have almost eliminated this species from many places. Jerusalem was highly malarious; it is now free from malaria. *A. elutus* is the chief rural vector; it breeds in stagnant pools, wells, swamps, and reservoirs overgrown with algae. *A. sergenti* most commonly breeds in very slowly moving streams and in seepages under rocks and pebbles; it is most in evidence from September to November when *P. falciparum* malaria is most prevalent. *A. superpictus* most commonly breeds in eddies and backwaters of fairly rapid streams. Like *A. elutus* it begins to breed in March and continues until the onset of the heavy November rains. Its association with epidemics of malaria has been noted on many occasions. *A. hyrcanus* var. *sinensis* breeds in marshes; it is most abundant from April to June. *A. algeriensis* also breeds in marshes and is the dominant species in marsh areas from January to March. *A. bifurcatus* is the most dangerous species; *A. elutus*, *A. sergenti*, and *A. superpictus* are all important vectors; they breed freely and enter houses. *A. hyrcanus* and *A. algeriensis* are usually confined to the marshland in which they breed.

The experience of the British Expeditionary Force in 1918 showed that Palestine's evil reputation for malaria was not undeserved and justified the gloomy forecasts then made as to the health conditions of Palestine. Wisely conceived control measures and patient, unremitting supervision have falsified those forebodings. The incidence of malaria throughout the country is now remarkably low. Nearly all urban areas are completely free from the disease, and its incidence is almost negligible in most populated rural areas. By 1925 urban malaria was well under control. The spleen rate of Jerusalem had fallen from 44·3 in 1919–20 to 0·8; in Jaffa from 16·6 to 4·9, and in Haifa from 39·0 to 5·7. Since 1925 there has been continued improvement. The spleen rate of town school-children has fallen from 4·6 in 1925 to 1·2 in 1940; of rural school-children from 12·0 to 5·4. In 1922, 7·2 per cent. of dispensary patients were suffering from malaria; in 1940 malaria patients formed 0·5 per cent. of attendances. Malaria remains, however, a potential danger in many parts of the country; neglect of routine measures may still result in severe outbreaks. As noted below there are still areas to be reclaimed.

P. vivax is most in evidence from June to September, *P. falciparum* from August to December. *P. malariae* is rare. The percentages of the three types found in blood films examined from 1922 to 1940 were *P. vivax* 67, *P. falciparum* 31, *P. malariae* 2.

Mosquito control in Palestine has been essentially antilarval. In towns all possible water-holding places are catalogued and inspected. Essential wells are mosquito-proofed; others are closed. Cisterns are provided with mosquito-proof tops. Other breeding places are regularly oiled. Residents of almost all towns and of the larger villages have cooperated. The rural malaria problem consists of the prevention of stagnation of water in summer, of drainage and irrigation

schemes, and of filling and pumping operations. The annual spring cleaning contributions by villagers and settlers under trained supervision, the clearing of the smaller *wadis* near their homes, and the channelling and draining of small swamps and bad irrigation systems, make possible the satisfactory application of oil or Paris green. The use of irrigation channels in rotation, making possible alternate drying of sets of channels, prevents mosquito breeding. This system has been followed for generations in the neighbourhood of Nablus; Nablus has always been free of malaria though the disease is common in surrounding villages.

In all important drainage schemes channelling by dynamite is the method of choice, but the soil must be wet; the cost is barely a tenth of that of manual labour.

Mosquito catching stations are now very widely used as a guide to mosquito breeding conditions.

Two underlying principles of malaria control work in Palestine are self-help and the welfare of rural cultivation. The prompt and energetic cooperation of the people is perhaps the most remarkable feature of anti-malaria work in Palestine. The people have seen the lasting effects of swamp reclamation and the benefits to health of proper irrigation and the rest. Some of the most fertile land of the country has been reclaimed and made healthy after centuries of waste.

Large zones of high malaria endemicity still remain to be dealt with; such are the Huleh and Naamein swamps, the wide stretch of the Jordan valley, and some extensive ravines. Their populations are sparse.

This successful control of malaria in Palestine has been carried out at very low cost. Direct anti-malarial measures cost about 1¼d. per head of the population per year. There is no separate anti-malaria service. The control of malaria is but one of the duties of the staff of the Department of Health. The cost of reclamation and major drainage schemes is of course additional. The value of the free labour contributed by the beneficiaries is also very large indeed.

The destruction of adult mosquitoes has been tried but it is neither widely recommended nor extensively used in Palestine as a practical measure of malaria control. *Norman White.*

POTENZA (L.). Estudio comparativo de los pigmentos bilharziano y malarico. [**Comparative Study of Bilharzial and Malarial Pigment.**]—*Rev. Policlinica Caracas.* 1941. Nov.–Dec. Vol. 10. No. 61. pp. 363–373. With 1 folding plate. [28 refs.]

Human material from fatal cases of malaria, in which the possibility of concomitant bilharzia infection could be excluded, and animals, experimentally infected with *Schistosoma mansoni*, afforded the material for this comparative study of malarial and bilharzial pigment. Very little difference was found between the two. Both produced a double refraction of polarized light. Morphologically there was little that could be called distinctive. The pigment in schistosomiasis is commonly dust-like in appearance; in malaria dust-like pigment is not rare. The small shot-like masses of pigment characteristic of malaria are not uncommon in schistosomiasis. The pigment in schistosomiasis is more circumscribed in the body than it is in malaria in which it is very widely diffused. In both diseases the pigment is

deposited in reticulo-endothelial cells. Both pigments are derived from blood pigment. [See this *Bulletin*, 1935, Vol. 32, pp. 126, 127.]

Norman White.

KOMÁREK (J.) & BREINDL (V.). Das heutige Verhältnis *Anopheles*-Tier-Mensch in Mitteleuropa. [**The Complex Anopheles-Animal-Man in Central Europe To-day.**]—*Z. angew. Ent.* 1941. Vol. 28. Pt. 2–3. pp. 501–506. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. May. Vol. 30. Pt. 5. pp. 74–75.]

Surveys in Bohemia and Moravia in 1940 showed that *Anopheles maculipennis*, Mg., var. *typicus* occurred sporadically throughout the region but was more common in the hills than in the lowlands, and that *A. m. messeae*, Flni., was numerous in summer in well watered plains and in river valleys. *A. claviger*, Mg., was limited to Bohemia, where it was common in late summer and autumn in the lowlands of the Elbe and Moldau and occurred up to about 3,000 feet.

The authors state that these Anophelines fed indiscriminately on man and any available domestic animals. They were abundant in village cowhouses, and almost completely absent from adjoining bedrooms, but this was due, not to a preference for the blood of the cattle, but to the microclimate resulting from the warmth and moisture produced by these animals in the dark, dirty, ill-ventilated and very warm cowhouses of the peasantry. They did not occur in the cowhouses on large estates, which are airy, light and clean, and have whitewashed walls.

It is concluded that these Anophelines are becoming semi-domesticated, and that the adults tend to disappear from the field and to collect in villages. Larvae were found in breeding places near villages, but not in apparently favourable ones at a distance from them. A newly emerged female seeking food is guided by the strong smell of cattle in the village, where access to cowhouses is easy, whereas bedroom windows are shut at night and the microclimate of the entrance to a dwelling is unattractive. The presence of many males in cowhouses points to a search for shelter, not food.

HADDOW (A. J.). **The Mosquito Fauna and Climate of Native Huts at Kisumu, Kenya.**—*Bull. Entom. Res.* 1942. June. Vol. 33. Pt. 2. pp. 91–142. With 24 figs. [20 refs.]

This paper contains a vast amount of data on the Anopheline and Culicine population of native huts, together with an account of the climate of the huts in relation to that of the outer air. The work was done in an area where malaria is hyperendemic among Africans and severe in the European and Asiatic populations; blackwater fever is present. Four identical huts, similar in type to those used by the native Africans, were built side by side about 100 yards from the margin of the papyrus swamp. They were set about 4 ft. apart, with the eaves touching, the doors directed inwards, the whole being sheltered by a large tree. To facilitate catching a hessian ceiling was inserted. Using one hut as a control, conditions were varied in the other huts and day catches and night catches of mosquitoes were

made. It was found that the temperature range in the hut was only about half that in a Stevenson screen about 50 yards from the huts, the temperature in the hut rarely falling below the level at which development of the malaria parasites in the mosquito is arrested : in the screen it frequently did so in the hours before dawn. Similarly the range of relative humidity in the hut was much smaller than in the screen, particularly in dry weather. Saturation deficit at night was always greater in the hut than outside. A hut crowded with natives was slightly warmer and its relative humidity somewhat lower than that of the control hut.

Catches made at intervals during the night showed that in the case of *A. gambiae* females there is a high population of resting mosquitoes at 7 p.m., a period of low entry from 8 to 10 p.m., a period of high entry from 11 p.m. to 5 a.m., and a sharp entry peak at 6 a.m., due to the arrival of females seeking shelter for the day. The results with *A. funestus* were similar, but the high rate of entry did not begin until 3 a.m. In both species mature females with group V ovaries enter mainly at dawn ; males of both species are scarce during the night but enter in large numbers at 6 a.m. to rest during the day. Comparable data were obtained with a number of Culicine species. *A. gambiae* and *A. funestus* are true house-haunting species. Females are abundant both by night and by day ; males by day only. They enter both for food and for shelter. Day catches, which include both males and females, give the best estimate of prevalence. In the day catches the great majority of Anophelines were taken on the ceiling ; those on the walls preferred the lower and darker half.

The effect of numbers of human inhabitants in a hut was studied by making simultaneous catches in huts containing 1, 5, 10 and 15 Africans respectively. There was a very close relationship between the size of the human population and the numbers of females of biting species taken. Non-biting species did not discriminate between the huts. For example, in two night catches, the combined numbers of *A. gambiae* and *A. funestus* in the four huts were 135, 251, 430 and 529. A further comparison was made between huts containing five washed, and five unwashed, natives respectively. All the important biting species preferred the hut with the unwashed natives. For example, in two night catches, 122 *A. gambiae* and *A. funestus* were taken in the huts with washed children : 223 in the hut with unwashed children. A hut with dirty clothing was preferred to a completely empty hut. In a comparison between a hut containing a native and one containing a calf, *A. gambiae* and *A. funestus* were more numerous with the native, both by day and night. For example, five night catches gave 430 *A. gambiae* and *funestus* with the native ; 43 with the calf. In the hut with the native, Anophelines formed 94 per cent. of the total catch ; with the calf Culicines formed 95 per cent. of the total.

At Kisumu the local incidence of *A. gambiae* is dependent on local rainfall. A threshold figure of five inches of rain per month is necessary before an increase can take place. The seasonal incidence of *A. funestus* is not connected with local rainfall. Increases take place when the level of Lake Victoria Nyanza rises. This rise is dependent on the rainfall of a large part of East Africa and is independent of local rainfall.

V. B. Wigglesworth.

THOMSON (R. C. Muirhead). **Studies on the Behaviour of** *Anopheles minimus*. **Part V. The Behaviour of Adults in Relation to Feeding and Resting in Houses.**—*Jl. Malaria Inst. of India.* 1941. Dec. Vol. 4. No. 2. pp. 217–245. With 1 fig. [13 refs.]

In the earlier papers of this series [this *Bulletin*, 1941, Vol. 38, p. 335 ; 1942, Vol. 39, p. 293] the author has been principally concerned with the behaviour of the mosquito in relation to the ecology of the breeding place. In the present paper he deals with some other aspects of behaviour, namely the activity of *A. minimus* in houses in relation to feeding and resting. The main daytime resting places of *A. minimus* in Assam and Northern Bengal are inside dark native houses and coolie huts. The temperature, humidity and light conditions in resting places are described and compared with those in a standard Stevenson screen and a typical cowhouse. At night the temperatures in cowsheds and coolie houses are practically identical, but by day the mean maximum temperature in cowsheds is some 2°C. higher than in the coolie huts ; and these are about the same amount cooler than the screen temperature outside. In laboratory experiments *A. minimus* showed no marked reaction when exposed to a choice of different degrees of atmospheric humidity. When exposed to a choice of temperature the chief reaction was a strong avoidance of higher temperatures. It is possible that this reaction may have some influence on the choice of daytime resting places. At sundown there is a strong attraction to light, and most mosquitoes leave the house at this time. There is no similar reaction at dawn. Marking and other experiments showed that there is a considerable daily turn-over of the population of *A. minimus* in houses. About 90 per cent. of blood-feeding takes place after midnight under natural conditions, and there is very little feeding activity during the two or three hours after sundown. During the hot damp monsoon season, *A. minimus* takes two days to digest its blood meal and develop its ovaries, ovipositing on the second night after feeding. In cold weather conditions, this period is increased to from four to six days. After ovipositing, *A. minimus* returns for a blood feed on the same night. The female lays more eggs per batch in the monsoon (average 137) than in the cold weather (average 82). *A. minimus* refused to mate in captivity, and in unfertilized females there is no development of ovaries after a blood meal. In fertilized females one blood meal is sufficient for egg-laying. Blood-feeding takes place throughout the year and there is no state of hibernation in the cold weather. In captivity *A. minimus* feeds readily on various animals ; on the cow more readily than on the goat. The fatal upper temperature is 37–38°C. for *A. minimus* adults, whereas for *A. vagus* the fatal zone is 40–41°C. Laboratory experiments suggest that *A. minimus* survives longer at the end of the rainy season than in the hot dry spells before the rains.

V. B. Wigglesworth.

THOMSON (R. C. Muirhead). **Studies on the Behaviour of** *Anopheles minimus*. **Part VI. Observations on the Cold Weather Breeding Places.**—*Jl. Malaria Inst. of India.* 1941. Dec. Vol. 4. No. 2. pp. 247–255. With 3 figs.

There has been much controversy about the importance of the cold weather breeding places of *A. minimus* in Assam and Northern Bengal

in relation to malaria transmission. The object of this paper was to put this question in proper perspective in the light of the author's recent work on the behaviour of this species. The development of eggs, larvae and pupae continues at the lowest mean temperatures (16°C.) likely to be encountered in a breeding place in the coldest part of the year. The output of adult *A. minimus* from a perennial river (these form the chief cold weather breeding places in Assam) was estimated by collecting all pupae in a measured length of grassy edge, transferring them to water in the laboratory with approximately the same mean temperature as the river, and recording the number of females produced and the number of days which elapsed before emergence. In this way it was shown that in suitable breeding places there is a considerable output of females in January, the coldest month of the year. In one typical perennial river there was a tenfold increase in larval density between the early part of February and the early part of April. During this two-month period there was a thirtyfold increase in the output of *A. minimus* from the same breeding place. In the dry zone of the Dooars the most important cold weather breeding places are perennial seepages and small streams formed from them. It is considered that any anti-malaria scheme should, if possible, include control of cold weather breeding places from the beginning of the year, or the beginning of February at the latest, until they are regularly flushed out by the first heavy rain, when attention must naturally be turned to monsoon breeding places. The author considers that breeding in many perennial rivers in Assam can be most simply controlled by removing the grassy edge and exposing the bare banks to sunlight. *V. B. Wigglesworth.*

VISWANATHAN (D. K.), DAS (Sribas) & OOMMEN (A. V.). **Malaria-Carrying Anophelines in Assam, with Special Reference to the Results of Twelve Months' Dissections.**—*Jl. Malaria Inst. of India.* 1941. Dec. Vol. 4. No. 2. pp. 297–306. With 2 graphs.

The authors summarize the results of dissection of 18,599 anophelines from different centres in Assam from July 1940 to June 1941. *A. minimus* is the most important malaria carrier, with a sporozoite index of 1·4 per cent. and an oöcyst index of 1·6 per cent. *A. maculatus* is of some importance in Shillong. But though exceedingly abundant, its preference for the blood of cattle renders it a very inefficient vector. *A. annularis* is considered a vector in certain parts of the Goalpara District. *A. culicifacies* and *A. philippinensis* are thought to be of no importance. Infected *A. minimus* were found from March to November. *V. B. Wigglesworth.*

RUSSELL (Paul F.) & RAMACHANDRA RAO (T.). **On Seasonal Prevalence of Anopheles Species in South-Eastern Madras.**—*Jl. Malaria Inst. of India.* 1941. Dec. Vol. 4. No. 2. pp. 263–296. With 2 text figs., 6 charts & 3 figs. on 2 plates. [10 refs.]

The authors made extensive collections of Anopheles larvae and adults over a three-year period, from March 1937 to February 1940, in the Pattukkottai taluk, Tanjore District, South Eastern Madras. This has an area of about 700 square miles which has recently been converted from a dry tract to a well-irrigated countryside. Routine

larval and adult catching stations were established and traps of special design set up to collect adult mosquitoes. Seasonal prevalences of the following 12 species are discussed: *A. aconitus*, *A. annularis*, *A. barbirostris*, *A. culicifacies*, *A. hyrcanus* var. *nigerrimus*, *A. jamesi*, *A. pallidus*, *A. subpictus*, *A. stephensi*, *A. tessellatus*, *A. vagus* and *A. varuna*. These are related to meteorological and seasonal conditions. Most attention is given to *A. culicifacies*. This is most prevalent in August and September as a result of the advent of irrigation water in mid-June. From September onwards the prevalence declines, for reasons which are obscure. Temperature and humidity did not seem important in this area in determining the adult and larval population, except perhaps during the coldest weather in December and January, when the low temperature may have retarded breeding. The period of lowest prevalence was from February to mid-June, when the breeding places, except tanks and wells, are rapidly drying up.

V. B. Wigglesworth.

RUSSELL (Paul F.) & RAMACHANDRA RAO (T.). **On the Ecology of Larvae of *Anopheles culicifacies* Giles, in Borrow-Pits.**—*Bull. Entom. Res.* 1942. Jan. Vol. 32. Pt. 4. pp. 341–361. With 6 figs. & 1 plate.

In the Tanjore District of Madras, borrow-pits form a main breeding place of *Anopheles culicifacies*. As these seepage-filled borrow-pits become older there is a progressive decline in the density of breeding, the largest numbers of larvae being found soon after water enters the newly dug pits. It is shown that this difference is due to increased oviposition by the female in the newer pits. The factors of rainfall, predators, macroscopic vegetation, hydrogen ion concentration, carbon dioxide, dissolved oxygen, alkalinity, hardness, chlorine, ammoniacal nitrogen, nitrates, nitrites, sulphates, iron and poisonous metals are not concerned in the change. Albuminoid nitrogen and oxygen absorbed may have some relation to it. There is a definite relationship with the plankton found in the water. Blue-green algae appear in the plankton in the declining phase of *A. culicifacies*; amorphous organic matter and more especially the total plankton, which show a progressive increase in the pits, are nearly always associated with a decline in larval density. Whether these changes *cause* the reduction has not been proved. If so the reduction must be due to an effect on the egg-laying female; the development of larvae is not adversely affected.

V. B. Wigglesworth.

SOEDARSONO. Twee gevallen van aangeboren malaria. [**Two Cases of Congenital Malaria.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1941. Dec. 9. Vol. 81. No. 49. pp. 2656–2657.

In both of these cases of malaria in new-born children the mothers had suffered from tertian malaria at or shortly before parturition. Both infants were under weight at birth and sickened almost immediately. Blood examination showed, in the one case on the 8th day, mature malaria parasites with no ring forms, and in the other both adult schizonts and rings. The first infant died and the history of the second was as follows:—

The mother, a 9-para, was delivered at term of a female child, 2·8 kgm. weight and 49 cm. in length. It cried vigorously, urinated and

defaecated normally. On the following day it was restless, cried much, had no fever, but blood films showed the presence of malaria parasites. A blood film of the mother on the day of admission had already shown malaria parasites. She had also had a malaria attack in the 8th month of pregnancy. The malaria of the infant was quickly cured with tannate of quinine.

It seems certain that these were cases of congenital malaria contracted *in utero.* *W. F. Harvey.*

COATNEY (G. Robert) & YOUNG (Martin D.). **A Study of the Paroxysms resulting from Induced Infections of** *Plasmodium vivax.*—*Amer. Jl. Hyg.* 1942. Jan. Vol. 35. No. 1. pp. 138–141. With 2 figs.

The observations described were undertaken to obtain measurements of the different phases in paroxysms resulting from induced infections of *P. vivax* in white male paretics. Data were collected on 338 paroxysms in 21 patients. All temperature readings were taken rectally at four-hour intervals; when the temperature was above 100°F. the temperature was taken every hour. Chills, actual shaking, occurred in 59 per cent. of the paroxysms. The temperature averaged 100·6°F. at the start of the chill; the average length of the chill was 39 minutes, and the average rise of temperature during the chill was 2·3°F. The average measurements of the 338 paroxysms were: 3 hours 52 minutes from onset of fever (100°F.) to fever-peak; 6 hours 18 minutes from fever-peak to end of fever; height of fever-peak 104·8°F. The maximal temperatures registered were on the average 0·7°F. higher in paroxysms with chills than in those without; this difference was statistically significant, 6·2σ. The average duration of fever was 2 hours 2 minutes shorter in paroxysms with chills. The average rate of fever rise was 3·3 times faster during the chill than during any other period of the attack: the temperature rose 1°F. in 17 minutes during the chill. *Norman White.*

SWARTZWELDER (John Clyde) & ADAMS (Charles Carroll). **Studies on the Protein Tyrosine Reaction as a Diagnostic Test for Malaria.**—*Amer. Jl. Trop. Med.* 1941. Nov. Vol. 21. No. 6. pp. 717–723.

The protein tyrosin reaction for the quantitative estimation of blood euglobulins, as a biochemical diagnostic test for malaria, was introduced by PROSKE and WATSON [this *Bulletin*, 1939, Vol. 36, p. 813]. The authors of the paper under consideration have introduced certain modifications into the technique of the reaction. Proske and Watson used a dilution of 1 : 30, 0·1 cc. of serum in 3 cc. of sodium sulphate; the authors use a dilution of 1 : 10, 0·5 cc. of serum in 5 cc. of 15·4 per cent. sodium sulphate. The dilution is important as it determines the amount of euglobulin precipitated from the serum. The authors use a colorimeter to read the tyrosine indices. A detailed description of the technique of the reaction is contained in the paper.

Normal standards were obtained from the examination of 93 normal sera. The tyrosine indices were above normal in six of nine patients suffering from *P. falciparum* malaria, in three of four patients suffering from *P. vivax* malaria, and in all of three patients with *P. malariae* infections. The tyrosine indices of six patients with paresis were very high, though they were free from malaria infection. In nine of 12 patients suffering from tuberculosis the indices were above normal.

High indices well above normal were obtained in seven out of eight cases of leprosy; the disease was arrested in the only patient with a normal index. The index was above normal in three of four patients suffering from typhoid fever, in two cases of granuloma inguinale [ulcerating granuloma of the pudenda], and in one case of lymphogranuloma inguinale.

The clinical value of the protein tyrosine reaction in the diagnosis of malaria is little more than supplemental. *Norman White.*

WINCKEL (Ch. W. F.). **Are the Experimental Data of Therapeutic Malaria Applicable to Conditions obtaining in Nature?**—*Amer. Jl. Trop. Med.* 1941. Nov. Vol. 21. No. 6. pp. 789–794. [10 refs.]

With regard to the divergent opinions that have been expressed regarding the value of observations on patients undergoing malaria therapy to malariology the author summarizes an interesting discussion as follows:—

"As a general rule experience with induced malaria in paretics may be applied to ordinary malarial patients, provided one keeps the following points in mind:

"(*a*) If *paretics* are infected by mosquito bite, their reaction to drugs differs from that in ordinary patients only in that the bodily resistance, incited by a considerable number of fever attacks, promotes the action of the drugs; as a consequence somewhat smaller doses suffice and clinical relapses are fewer.

"(*b*) In treating *paretics* whose malaria had been induced by blood inoculation the possibility of relapses in benign tertian and quartan malaria may be ruled out altogether. Here again smaller doses than used in ordinary practice suffice." *Norman White.*

SCHWARTZ (Leon), FURST (William) & FLIPPIN (Harrison F.). **Sulfathiazole as an Antimalarial.**—*Amer. Jl. Hyg.* 1941. Nov. Vol. 34. No. 3. Sect. C. pp. 160–162. [11 refs.]

Nine patients undergoing malaria therapy with artificially induced *P. vivax* infections were the subjects of this study. The number of chills varied from 3 to 15 before attempts were made to terminate the malaria infections with sulphathiazole. The drug was given by mouth: the initial dose was 3 gm. followed four hours later by another 3 gm.; thereafter 1 gm. was given every four hours. The total amount given varied from 25 to 50 gm. Chills and fever ceased in all cases. No parasites could be found in the peripheral blood after treatment in five patients; one of these had a relapse 15 days later. The other four patients in this group were free from any manifestation of malaria for a period of over 90 days. The blood of four patients continued to harbour parasites; they had relapses 12, 13, 16 and 20 days, respectively, after the termination of the treatment. There were no serious toxic symptoms in any case. Blood concentrations of the free drug ranged from 3 to 5 mgm. per cent. *Norman White.*

MANFREDONIA (Mario). L'adrenalina endovena per la cura della malaria. [**Intravenous Adrenalin in the Treatment of Malaria.**]—*Riv. di Malariologia.* Sez. I. 1941. Sept.–Oct. Vol. 20. No. 5. pp. 329–340. French summary.

The noteworthy number of soldiers suffering from malaria, invalided from Albania, necessitated the establishment in September 1939 of a

convalescent home at Pozzuoli for their treatment. Most were acute primary infections ; 400 of them were subjected to Ascoli's treatment associated with quinine given by mouth. The results were stated to have been most satisfactory. This lengthy paper covers no new ground but amply confirms the many favourable reports on Ascoli's treatment that have been published. *Norman White.*

DRENSKY (K.). Bekämpfung und Erforschung der Malaria in Petritsch (Bulgarien). [**Malaria Control and Investigation in Petritsch (Bulgaria).**]—*Ztschr. f. Hyg. u. Infektionskr.* 1939–40. Vol. 122. pp. 550–559. With 7 figs.

The chief malarial regions in Bulgaria are situated along the great rivers Danube in the north, Maritza in the centre, and Struma in the south-west, and in the coastal region in the east. In the Danube region the chief mosquito is *Anopheles maculipennis* (var. *messeae* and *typicus*) ; the malaria is entirely simple tertian and the splenic index is 5 to 10 per cent. In the Black Sea coast region the mosquitoes are *A. maculipennis* (var. *elutus* and *typicus*) and also *A. superpictus* ; in spring the malaria is chiefly simple tertian, but in the autumn the amount of disease increases and malignant tertian is commoner, so that the splenic index reaches 81 to 100 per cent. The same is true of the Struma valley. The mortality from malaria in the coastal region lies between that of the Danube and that of the Struma. These malarial regions are inhabited by about a million people, of whom about 300,000 (5 per cent. of the total Bulgarian population) suffer from malaria.

As at times the mortality from malaria was greater than that from all other diseases together, it was decided that something must be done to deal with the situation. The first attempts consisted of little more than the free issue of quinine and other medicaments ; but the good results were only limited, and eventually the Rockefeller Foundation decided to establish an antimalaria station at Petritsch on the Struma in south-west Bulgaria. The place was heavily infected, the spleen index was 90 to 95 per cent., the parasite index 60 to 65 per cent., and there were everywhere numerous breeding places of *Anopheles maculipennis* and *A. superpicus*. Of the 12 surrounding settlements 10 (protected villages) were selected for total destruction of breeding places by means of spraying with Paris green, etc. In the remaining two (control villages) an attempt was made to control the disease simply by quinine. Every year the results were examined by mass investigation of the number of Anopheles, the spleen- and parasite-indices, and the frequency of new cases. The data obtained during the last 10 years are set out in a series of diagrams from which the superiority of the antilarval measures is clearly seen.

The conclusion is reached that a systematic anti-mosquito-larva campaign by draining, and destruction of the breeding places by Paris green and street cleaning, affords an extremely effective and at the same time cheap method of rendering healthy a heavily infected region. The campaign was attended by a great decrease in the number of Anopheles in dwellings and stables, by a striking fall in spleen- and parasite-indices, and by a great diminution in the number of new cases. *W. Yorke.*

LVOVSKY (I. L.). [**Chlorophenol as a Larvicide.**]—*Trans. Kuibyshev Milit. Med. Acad. Red Army.* 1940. Vol. 4. pp. 283–287. [In Russian.]

Having first established by laboratory experiments the larvicidal properties of chlorophenol, especially when mixed with petroleum, the author tested the mixture under natural conditions, in a pond and river. The dosage sufficient to kill mosquito larvae and pupae in from two to four hours was 30–40 cc. of a 10 per cent. mixture of chlorophenol with petroleum per 1 sq. metre of the surface. This mixture proved to be more effective than petroleum alone, when used as control. Chlorophenol also has the advantage of being cheap and easy to store. *C. A. Hoare.*

RUSSELL (Paul F.). **Some Social Obstacles to Malaria Control.**—*Indian Med. Gaz.* 1941. Nov. Vol. 76. No. 11. pp. 681–690. [10 refs.]

Progress in malaria control has not kept pace with the acquisition of knowledge as to how malaria can be controlled. The author in a long and useful paper discusses some "social" reasons for the perpetuation of malaria as a public health problem of primary importance. The paper does not lend itself to adequate summary in small space.

The author discusses obstacles to progress under the following heads :—

(1) Absence of a sufficient weight of public opinion which has been enlightened regarding (*a*) economic and public-health importance of malaria ; (*b*) available measures of malaria prophylaxis and control ; (*c*) social responsibility for prevention of malaria.

(2) Lack of sound administrative principles, especially as regards (*a*) co-ordination of, and effective distinction between, hygiene and preventive care on the one hand, and preventive medicine and medical-surgical care on the other ; (*b*) methods of obtaining effective co-operation between such governmental departments as public works, agriculture and public health ; (*c*) necessity for continuity of effort when dealing with malaria.

(3) Lack of adequate training of health officers in practical malaria control methods and lack of sufficient numbers of specialist personnel, such as malariologists, malaria entomologists, engineers, and agronomists.

(4) Lack of official cognizance of economic considerations as to (*a*) what malaria actually costs a community ; (*b*) what benefits the control of malaria would confer on a community ; (*c*) what constitutes a proper budget item for malaria control.

(5) Inadequate knowledge of methods for applying practically, that is effectively and economically, the results of research in malariology.

[There is a familiar ring about many of these complaints ; they have served as texts for sermons by many health officials in many lands. This does not imply that the present paper is redundant. The author preaches well and with authority. May he have a large and responsive audience.] *Norman White.*

BOSE (P. N.). **Anti-Malarial Operations in India.**—*Indian Med. Gaz.* 1941. Nov. Vol. 76. No. 11. pp. 690–695.

The author made a study tour, visiting Assam, Madras, Ceylon, Mysore and Delhi, where he obtained much information regarding

anti-malaria work in progress. His observations are condensed in a readable report. All, or nearly all, the work he describes has been published elsewhere. *Norman White.*

HESS (A. D.) & TARZWELL (Clarence M.). **The Feeding Habits of** *Gambusia affinis affinis*, **with Special Reference to the Malaria Mosquito,** *Anopheles quadrimaculatus.—Amer. Jl. Hyg.* 1942. Jan. Vol. 35. No. 1. pp. 142–151. With 2 figs. & 2 graphs.

These investigations were carried out in the Wheeler Reservoir in the Tennessee Valley, where Gambusia rapidly became abundant. The forage ratio was used as a measure of the feeding preference of Gambusia for anopheline larvae and pupae; this is obtained by dividing the percentage of a given kind of organism in the stomachs by its percentage in the environment. A forage ratio of 1 indicates that an organism is being taken at random; above 1 that it is being selected in preference to, or is more readily available than, other organisms. The studies were made in a barrier seine, to insure that the fish had fed in the plot from which samples of food organisms were collected, in three types of area representing different ecological conditions. The size of the forage ratio for both anopheline and culicine larvae and pupae was directly correlated with their population densities; when present in equal numbers the preference was for culicines. As densities of larvae and pupae increased the number of Gambusia eating them, and the number eaten per fish, both increased. The forage density for Anopheles was 1 when the larval density was about 2 per square foot of water surface; below this it decreased; above this it increased, reaching 14 when the larval density was 17 per square foot. Large female Gambusia eat less plankton and more macroscopic food than do small females and males of all sizes; they are therefore the most effective predators of Anopheles. For all diptera Gambusia prefers pupae to larvae, and later larval instars to early ones. Entomostraca were fed upon through necessity rather than choice. It would seem that availability rather than choice determines the menu of Gambusia. *Norman White.*

SEURAT (L. G.). Le Cyprinodon rubané et les poissons culicivores de la Tunisie. [**The Striped Cyprinodon and Larvivorous Fish of Tunisia.**]—*Arch. Inst. Pasteur de Tunis.* 1941. Dec. Vol. 30. No. 3–4. pp. 245–265. [Bibliography.]

MORRISON (Dempsie B.) & ANDERSON (W. A. D.). **On the Role of Parasite Pigment in the Malaria Paroxysm.**—*Public Health Rep.* 1942. Jan. 30. Vol. 57. No. 5. pp. 161–174. With 6 figs. [14 refs.]

Certain experiments on dogs having shown that intravenous injections of solutions of disodium ferrihaemate (alkaline haematin) are followed by symptoms of toxicity (elevations of temperature, however, not being one of them), the suggestion was made that the symptoms of a malarial paroxysm might be due to the pigment liberated by sporulating parasites. To test this view injections of ferrihaemate were carried out on monkeys, and the resulting symptoms were compared with those of malaria due to infection with *Plasmodium knowlesi.* It was noted that little if any ferrihaemate in soluble form

occurred in the blood of malaria-infected monkeys, the ferrihaemate within the parasite at sporulation being rapidly phagocyted by the reticulo-endothelial system. Ferrihaemate-injected monkeys die in shock with symptoms indicative of capillary blockage in vital organs, or recover very rapidly and completely after a brief period of acute toxic reaction. The conclusion is that ferrihaemate is not a causative agent in the malarial paroxysm of monkeys, since the pigment is not liberated in soluble form from the parasites. *C. M. Wenyon.*

VEZZOSO (Bartolomeo). L'immunità passiva nell'infezione da *Plasmodium gallinaceum.* Nota seconda. [**Passive Immunity in** *P. gallinaceum* **Infection.**]—*Riv. di Malariologia.* Sez. I. 1941. July–Aug. Vol. 20. No. 4. pp. 238–250. With 5 graphs. English summary.

In an earlier publication the author recorded experiments which showed that the serum of fowls which had recovered some months before from a *Plasmodium gallinaceum* infection did not produce any passive immunity to infection with this parasite when injected into healthy fowls. In a further series of experiments described in the present paper the author shows that the serum of fowls which had recovered only a short time (10–50 days) before the serum was taken was able to confer some immunity. This was evidenced by the longer incubation period, the shorter period during which parasites are present in the blood and the more rapid disappearance of the clinical manifestations of infection. To obtain the best results it is necessary to administer relatively large doses of the serum (20–25 cc. per kilo. of body weight) and to continue the administration throughout the infection. *C. M. Wenyon.*

TRYPANOSOMIASIS.

ZSCHUCKE (Johannes). Ueber Kernhinterendformen bei westafrikanischen Stämmen des *Trypanosoma gambiense.* [**Posterior Nuclear Forms in West African Strains of** *T. gambiense.*]—*Ztschr. f. Hyg. u. Infektionskr.* 1939–40. Vol. 122. pp. 620–625.

The problem of the identity of *T. gambiense* and *T. rhodesiense* is bound up with the question whether the appearance of posterior-nuclear forms in the blood of inoculated rodents is specific for the latter parasite. Although posterior-nuclear forms have already been demonstrated in *T. gambiense* by KLEINE, LESTER and others, there is as yet no general agreement on the subject; however, the present observations made by the author in Fernando Po throw more light on the matter.

The sleeping sickness focus in Fernando Po is of considerable antiquity, and history shows that the disease was introduced into the island with the slave trade before 1815. Since that time new human beings have been constantly deposited in the island amidst the old focus of disease. Presumably the natives would exhibit differences in natural immunity, and this theory agrees with the fact that although the disease in Europeans runs the same course it differs greatly in the coloured races.

The author points out that in 1929 and 1930 he had infected mice and guineapigs with Fernando Po strains but had not succeeded in

finding posterior-nuclear forms of the trypanosome. In the present investigation, made 10 years later, he examined strains obtained from 10 acute cases of sleeping sickness (native and European). The parasites were inoculated intracerebrally, intraperitoneally, subcutaneously and intravenously, into white mice or guineapigs. Posterior-nuclear forms were found in 6 of these 10 strains—five times in mice and three times in guineapigs. They appeared in only one, or at most two, of the inoculated animals and only in small numbers, never more than 1 per cent. of the total forms. In mice they were found only after intracerebral inoculation or after intravenous inoculation in animals which had received an intracerebral injection of 2 per cent. starch solution. In guineapigs posterior-nuclear forms were found after subcutaneous and intraperitoneal inoculation. Most of the animals showing posterior-nuclear forms exhibited a shorter incubation period, but the length of life was usually longer, and consequently it is possible some of the other animals would have shown posterior-nuclear forms had they lived longer. The results of this work are summarized in a table.

The general conclusion reached is that things have changed in Fernando Po during the last 10 years. The trypanosome has become more virulent, and it has begun to exhibit posterior-nuclear forms in subinoculated animals. These facts are to be related to the continual introduction of completely susceptible natives into the island and furnish additional evidence of the identity of *T. gambiense* and *T. rhodesiense.* *W. Yorke.*

STAPLES (R. R.). **Anti-Tsetse Clearing and Land Use.**—*East African Agric. Jl.* 1941. Vol. 7. No. 1. pp. 48–50. [10 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. May. Vol. 30. Pt. 5. p. 75.]

It has frequently been assumed that clearing land of its bush and tree growth as a means of controlling tsetse flies (*Glossina*), as has been largely done in Tanganyika Territory, encourages soil erosion and decreases soil fertility and water supply. In this paper, it is pointed out that on the contrary, under the semi-arid conditions of eastern Africa, bush clearing decreases erosion, which is particularly bad in wooded grazing areas because the ground vegetation is thin and annual and numerous footpaths are formed on account of obstructions ; grass ley may be as good as or even better than bush ley in restoring soil fertility after cultivation ; and clearing undoubtedly improves the carrying capacity of the land, while there is reason to expect its effects on water supply to be beneficial. It is concluded that bush clearing is not only an effective anti-tsetse measure, but is also probably essential to the full use of the land for mixed farming.

[See also LEWIS, below, p. 653.]

VON BÜLOW (T.). Tripanosomiasis Americana. (Enfermedad de Chagas.) Primeros casos en Costa Rica. [**Chagas's Disease. First Cases reported in Costa Rica.**]—*Rev. Medica.* San José. 1941. June. Year 7. Vol. 4. No. 86. pp. 497–520. With 6 figs. [11 refs.]

The author reports two cases, one in a boy of 13, the other in a boy of two years of age. They were straightforward cases, showing the usual

signs of palpebral oedema, dacryoadenitis and glandular enlargement, and the trypanosome present in the blood. The reason for recording the cases is that none has hitherto been seen in Costa Rica. The local transmitter is *Triatoma dimidiata*. A spot map shows the present known distribution of the insect on the peninsula of Nicoya and the adjacent part of Puntarenas. *H. H. S.*

CULBERTSON (James T.) & KESSLER (Walter R.). **Age Resistance of Mice to** *Trypanosoma cruzi.—Jl. Parasitology.* 1942. Apr. Vol. 28. No. 2. pp. 155–158.

It is well known that *Trypanosoma cruzi* causes a more severe infection in young persons and animals than in older individuals. The present paper describes an attempt to fix this age for mice by studying carefully the relative susceptibility of mice of different known age groups. The following is the summary :—

"Mice below 25 days of age when infected generally succumb to *Trypanosoma cruzi* administered intraperitoneally, whereas mice above this age usually survive the infection. The infections in young animals develop after a shorter prepatent period and attain greater intensity than those in older animals.

"Mice below 9 days of age can regularly be infected with *Trypanosoma cruzi* administered by mouth, and those from 9 to 16 days old often prove susceptible. Mice 20 days old or more resist the parasite given orally. Infections resulting from oral administration of *Trypanosoma cruzi* are generally less intense and less frequently fatal than infections following the intraperitoneal administration of the parasite."

W. Yorke.

LEISHMANIASIS.

ADLER (S.). **Diagnosis of Kala-Azar.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. Mar. 6. Vol. 35. No. 5. p. 290.

In this note Adler points out that if the diagnosis of kala azar in the Mediterranean area rested on examination of smears from spleen, liver, sternum and gland puncture alone, a small but important number of cases would be missed because parasites are rare in the viscera. Some of these cases may be severe. They can readily be diagnosed, however, by sowing the juice of any punctured organ on several tubes of suitable medium, and this procedure should be adopted as a routine.

C. W.

MARTÍNEZ NIOCHET (Arminio) & PONS (Adolfo R.). Primer caso de kala-azar en Venezuela. [**First Case of Kala Azar in Venezuela.**]—*Gac. Med. de Caracas.* 1941. Sept. 15 & 30. Vol. 48. Nos. 17 & 18. pp. 329–332.

The paper describes the first autochthonous case of kala azar to be met with in Venezuela. The patient was a man, 28 years of age, in the State of Guárico. The diagnosis was made by the discovery of leishmania in smears of the liver, spleen, bone marrow and skin.

C. M. Wenyon.

MARTINS (A. Frância). Do diagnóstico sorológico das leishmanioses. [**Serological Diagnosis of the Leishmaniases.**]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1940. May. Vol. 5. No. 9. pp. 33–44. [24 refs.] English summary (8 lines).

The author discusses the various serological reactions which have been employed for the diagnosis of kala azar. He notes that few attempts have been made to apply these to the diagnosis of mucocutaneous leishmaniasis and expresses the opinion that the tests are not yet of sufficient accuracy to permit of their practical use.

C. M. Wenyon.

ROIG Y RAVENTÓS (J.) Reflexiones clinicas suscitadas por tres casos de kala-azar infantil y pielitis. [**Three Cases of Infantile Kala Azar with Pyelitis.**]—*Rev. Clin. Española.* 1941. Dec. 1. Vol. 3. No. 6. pp. 533–537.

In describing three cases of infantile kala azar in Spain the author notes that in all three the diagnosis was obscured by a concurrent pyelitis. It was only after some delay and a failure to respond to treatment that some other condition was suspected and a correct diagnosis of kala azar made by puncture of the spleen. Treatment led to recovery in two of the cases but the third patient died. The author discusses the distribution of kala azar and emphasizes the importance of early diagnosis, as the fatal cases are mostly the result of delay in arrival at a correct opinion as to the nature of the illness.

C. M. Wenyon.

i. TOBIAS (R. L.). **Recent Experiences on a Series of Twenty Cases of Kala Azar.**—*East African Med. Jl.* 1942. Feb. Vol. 18. No. 11. pp. 336–340.

ii. ——. **Two Cases of Severe Agranulocytosis following on Kala Azar.**—*Ibid.* pp. 341–344.

i. In the first of these papers the author describes the clinical features of 20 cases of kala azar in askaris who had been stationed in Western Abyssinia. The cases were divisible into two main types—acute and subacute—but not infrequently cases of one type might change in character and come to resemble those of the other type. The majority of the cases were submitted to diagnostic puncture of the spleen, sternum and lymphatic glands. In no case were leishmania discovered in material from gland puncture. They were seen in only one of 12 as a result of sternal puncture and in 8 of 17 submitted to spleen puncture. In one case a culture of leishmania was obtained from the peripheral blood.

ii. In the second paper two cases of kala azar in middle-aged African soldiers who had been in Western Abyssinia are described. Both cases were progressing favourably when they developed a severe degree of agranulocytosis. One case was treated with pentide and blood transfusion and the other with pentide and adrenalin. In both cases death followed a sudden collapse.

C. M. Wenyon.

KIRK (R.). **Studies in Leishmaniasis in the Anglo-Egyptian Sudan. V.—Cutaneous and Mucocutaneous Leishmaniasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. Mar. 6. Vol. 35. No. 5. pp. 257–270. With 4 figs. on 2 plates. [31 refs.]

In this interesting paper the author discusses the relationship to one another of the various types of leishmania infection which are met with in the Anglo-Egyptian Sudan. The problem is a difficult one, for there is no marked distributional separation of purely cutaneous cases of oriental sore and undoubted ones of visceral leishmaniasis or kala azar. Furthermore, cutaneous ulcers resembling oriental sore not infrequently complicate kala azar, while oral leishmaniasis, regarded hitherto as an instance of S. American espundia, may be associated with visceral infection. All these types may occur side by side in the same district while, as in India, cutaneous lesions of various non-ulcerating types may occur after treatment for kala azar. It is evident that there is considerable difficulty in deciding whether an ulcer of the skin in which leishmania can be demonstrated is oriental sore or a cutaneous complication of kala azar. As far as the Sudan is concerned the author limits a diagnosis of oriental sore to those cases which remain afebrile and in which no evidence of visceral or oral infection can be made out. The purely cutaneous infections are of two types—ulcerating oriental sore and non-ulcerating nodules, while the cutaneous lesions which occur in the course of generalized infections may be ulcerating lesions in untreated cases or non-ulcerating lesions following successful treatment of the visceral infection. In his discussion the author illustrates his remarks by short descriptions of cases and makes reference to previous papers in which he has dealt with one or other aspect of the subject under consideration. The paper is a very thoughtful attempt to clarify the difficult problem of leishmaniasis in the Sudan. It is worthy of very careful study.

C. M. Wenyon.

HRAD (Otto). Zur Kenntnis der Orientbeule. [**Oriental Sore.**]—*Med. Klin.* 1942. Feb. 20. Vol. 38. No. 8. pp. 178–180. With 3 figs.

The case recorded is that of a woman who contracted oriental sore as a child in Turkestan. A nodular lesion developed over the right malar bone and persisted without increase in size for 11 years, when she was seen by the author in Rumania. Small nodules had developed in the neighbourhood of the primary lesion, producing an appearance of lupus. Leishmania were discovered after prolonged search, and a cure was brought about by electrocoagulation therapy.

C. M. Wenyon.

PESSÔA (S. B.) & PESTANA (Bruno Rangel). Lesões iniciais na leishmaniose tegumentar americana. [**Initial Lesions in American Cutaneous Leishmaniasis.**]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1940. May. Vol. 5. No. 9. pp. 15–20. With 2 figs. on 1 plate. English summary (6 lines).

The author describes four cases in which lesions on the skin or lips are regarded as the primary or initial changes in leishmania infections. These have the form of papular or erythematous elevations of the skin, or impetiginous foci, or fissures on the lips. In one case scrapings from a cutaneous lesion with still intact skin revealed very large numbers of leishmania. In the other cases the parasites were much fewer.

C. M. Wenyon.

PESSÔA (S. B.) & PESTANA (Bruno R.). Infecção natural do *Phlebotomus migonei* por formas em leptomonas, provavelmente da *Leishmania brasiliensis*. [**Natural Infection of** *P. migonei* **by Leptomonad Forms, probably of** *L. brasiliensis*.]—*Arquivos de Hig. e Saúde Pública*. São Paulo. 1940. Sept. Vol. 5. No. 10. pp. 45–49. With 2 figs. on 1 plate. English summary.

—— & COUTINHO (J. O.). Infecção natural do *Phlebotomus pessoai* por formas em leptomonas, provavelmente da *Leishmania brasiliensis*. [**Natural Infection of** *P. pessoai* **by Leptomonad Forms, probably of** *L. brasiliensis*.]—*Ibid*. 1941. May. Vol. 6. No. 12. pp. 15–20. With 4 figs. on 1 plate. English summary (5 lines).

COUTINHO (J. O.). Localização de formas em leptomonas, possivelmente de *Leishmania brasiliensis*, no faringe do *Phlebotomus pessoai* naturalmente infectado. [**Leptomonad Forms possibly of** *L. brasiliensis* **in the Pharynx of Naturally Infected** *P. pessoai*.]——*Ibid*. pp. 23–29. With 3 figs. (1 coloured) on 2 plates. English summary (6 lines).

These papers record the results of the examination of sandflies for possible leishmania infection in a locality (Alta Paulista) of Brazil where cutaneous leishmaniasis is endemic.

In the first paper an account is given of the examination by serial section of 1,340 specimens (*Phlebotomus migonei* 910, *P. whitmanni* 320, *P. pessoai* 110). Two specimens of *P. migonei* were found to have a leptomonad infection of the anterior part of the alimentary tract. The flagellates are identified as evolution forms of *Leishmania brasiliensis*.

In the second paper are described further examinations of sandflies in the same or neighbouring localities. In this case dissections alone were carried out and smears made. The result was that two specimens of *P. pessoai* were found infected. The illustrations show undoubted leptomonads.

In the third paper an account is given of the examination by serial section of 164 specimens of *P. pessoai* and 118 of *P. whitmanni*. A leptomonad infection of one *P. pessoai* was discovered. Illustrations show the flagellates in the pharynx of the fly. *C. M. Wenyon.*

VILLELA (F.), PESTANA (Bruno R.) & PESSÔA (S. B.). Presença da "Leishmania brasiliensis" na mucosa nasal sem lesão aparente, em casos recentes de leishmaniose cutânea. [*L. brasiliensis* **in Apparently Intact Nasal Mucosa in Cases of Cutaneous Leishmaniasis.**]—*Arquivos de Hig. e Saúde Pública*. São Paulo. 1940. May. Vol. 5. No. 9. pp. 23–30. With 1 fig. English summary (10 lines).

In twelve cases of cutaneous leishmaniasis the authors have made a careful examination of the nasal mucosa, though there was no indication that this was involved. In five of the cases lesions were discovered which in some cases were only detectable on magnification. In the other cases the mucosa appeared to be normal. Scrapings were made from the mucosa of these seven cases and in four leishmania were discovered. The conclusion is that in the treatment of cases of tegumentary leishmaniasis it is necessary to employ eparseno as well as

antimonials, as this is the only drug which acts upon leishmania infection of mucous membranes. [Eparseno is an arsphenamine solution ready for injection. See this *Bulletin*, 1940, Vol. 37, p. 353.]

C. M. Wenyon.

COUTINHO (J. O.) & BARRETTO (Mauro Pereira). Contribuição para o conhecimento dos flebotomos de São Paulo. I.—*Phlebotomus fischeri* Pinto, 1926 e *Phlebotomus pessoai*, n. sp. (*Diptera, Psychodidae*). [**Phlebotomus of São Paulo.** *P. fischeri* **and** *P. pessoai.*]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1941. May. Vol. 6. No. 12. pp. 33–48. With 29 figs. [12 refs.] English summary (8 lines).

GALVÃO (A. L. Ayroza) & COUTINHO (J. O.). Contribuição ao estudo dos flebótomos de São Paulo. Dipt. 1a. Nota. [**Phlebotomus of São Paulo.**]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1941. May. Vol. 6. No. 12. pp. 51–65. With 22 figs. & 2 plates. [11 refs.] English summary.

BARRETO (Mauro Pereira). Observações sobre a biologia do *Phlebotomus intermedius* Lutz e Neiva, 1912 (Diptera, Psychodidae) em condições experimentais. [**The Biology of** *P. intermedius.*]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1941. May. Vol. 6. No. 12. pp. 107–119. With 4 figs. on 2 plates. [12 refs.] English summary (5 lines).

BARRETO (Mauro Pereira). Observações sobre a biologia do *Phlebotomus whitmani* Antunes e Coutinho, 1939 (Diptera, Psychodidae) em condições experimentais. [**The Biology of** *P. whitmani.*]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1941. May. Vol. 6. No. 12. pp. 123–131. English summary.

TYPHUS.

PUBLIC HEALTH REPORTS. 1942. Mar. 20. Vol. 57. No. 12. pp. 442–444.—**Typhus Fever.**

In this collection of reports from foreign countries it is noted that, at the end of January 1942, typhus was spreading in Algeria with great rapidity. The numbers of cases had recently trebled in the Departments of Algeria and Oran while in that of Constantine they had increased sixfold. From January 1st to 20th, 1942, there were 2,146 cases. It is reported that injections of serum have shown good results [the serum referred to may have been that described by DURAND and BALOZET, this *Bulletin*, 1942, Vol. 39, p. 543].

In Morocco 793 cases were reported in one week in February 1942, and in Spain there were 638 in the four weeks to 24th January. In Tunisia 888 cases were reported in two weeks in January and February 1942.

All these figures are higher than in preceding periods, and it is evident that in North Africa there has been a serious spread of this disease.

C. W.

SEIFFERT (Gustav). Ein Index für Fleckfieberverseuchung. [**An Index of Typhus Infection.**]—*Muench. Med. Woch.* 1942. Apr. 3. Vol. 89. No. 14. pp. 304–306.

The name " typhus infection index " is proposed as a designation for the percentage of the people of a community who react to *Proteus OX19* in titres of 1–100 and over. Lower titres are sometimes found in convalescents for months, but anything in excess of 1 100 can be regarded as evidence of an inapparent attack or of the person's being a carrier of

infective Rickettsiae. The "louse-index" is also carefully estimated and taken into account in determining what measures of control are needed.

At least 50 persons should be examined if possible: children are the best subjects for the survey because they frequently suffer from attacks which are easily missed. The titre of 1–100 has been selected, but all persons who give a clearly positive reaction in this titre are tested again to find the end-point.

The index was found to be zero in 100 German soldiers, also in 100 Russian prisoners of war who had been quarantined for long periods and repeatedly deloused: 10 persons in the latter group gave histories of previous attacks of typhus fever. In another group of 100 Russian prisoners who had been quarantined for a shorter period the index was 16: investigation of the other prisoners belonging to the same camp revealed the existence of two cases of typhus and in the following days 25 cases of the disease occurred. Most of these cases were mild and would hardly have been recognized if the survey had not been made. The 16 persons who reacted showed no signs of disease although eight of them reacted in titres of 1–400 to 1–1,600, and so must either have been suffering from abortive attacks or have had previous attacks which rendered them immune from the disease but did not prevent the lighting up of the agglutinins in response to a fresh invasion by Rickettsiae. *John W. D. Megaw.*

WALTHER (G.). Das klinische Bild des Fleckfiebers. [**The Clinical Features of Typhus Fever.**]—*Muench. Med. Woch.* 1942. Apr. 3. Vol. 89. No. 14. pp. 299–304. [35 refs.]

This paper was written by special request: it gives a detailed and fully documented account of the clinical aspects of typhus fever. It contains little that is new, but in view of the special interest of the disease at the present time the following points may be worth noting. *Rickettsia prowazeki* remains virulent for months in the dried faeces of lice; infection through the respiratory or conjunctival routes is therefore possible, and cases have been reported of infection by inhalation. The virus is killed by heat at 45°C. and by 0·5 per cent. carbolic in 30 minutes. Corrosive sublimate, 1–6,400, is also effective. One cmm. of blood from the 7th till the 12th day of the disease contains about 100,000 Rickettsiae so that care must be taken when blood samples are being collected.

The Weil-Felix reaction to *Proteus OX19* in titres of 1–160 and over is regarded as diagnostic; this occurs in nearly 100 per cent. of cases by the 6th day. A bacillary suspension of *Proteus OX19* with added alcohol keeps for several years and obviates the need for fresh cultures. Kudicke and Steuer's dry-blood method is useful in field work, so is Brumpt's reaction which needs only a small drop of blood mixed with a suspension of *Proteus OX19* stained with methylene blue. In positive cases the drop of the mixture, placed on a glass slide, soon shows at the margin a blue ring consisting of stained bacilli; inside this is a zone which is hardly coloured. In negative cases the preparation is uniformly stained.

An agglutination reaction in which Rickettsiae are used has the advantage of being truly specific; it does not give positive reactions, such as are seen with the Weil-Felix test, in cases of jaundice, undulant fever and even in some cases of typhoid fever.

Infective lice have been recovered from patients up to 24 days after the end of the fever. Inapparent cases, especially in children, and virus carriers must be taken into account.

Protective vaccination is discussed, but delousing is regarded as being still the essential method of preventing and controlling epidemics.

John W. D. Megaw.

LIU (Wei-T'ung), ZIA (S. H.), CHUNG (H. L.) & WANG (C. W.). **Typhus Fever in Peiping. Epidemiological Considerations.**—*Amer. Jl. Hyg.* 1942. Mar. Vol. 35. No. 2. pp. 231–250. With 1 map & 1 fig. [38 refs.]

Three of the authors, Liu, Zia and Chung, have already published several reports in which they have discussed the intriguing problem of the relationship between louse-borne and flea-borne typhus fever. Their previous arguments are repeated in this paper and a certain amount of additional evidence is brought forward in support of the view that flea-borne and louse-borne typhus fevers coexist in Peiping and that there, as in Mexico, epidemics may originate from rodent reservoirs. It is stated that further investigation is needed to determine whether all epidemics arise from rodent reservoirs or whether some epidemics may start from cases of inapparent infection or from human carriers.

Altogether 491 cases of typhus were treated in the Peiping Union Medical College Hospital from 1921 to 1940, of these about 60 per cent. were certainly or possibly acquired by louse-borne infection, the rest were in relatively cleanly persons and in the majority of them no association with lice or with previous cases was reported. In six instances of apparently isolated endemic attacks cases of the disease had been reported from the same premises several months or years previously. Most, if not all, the residences in Peiping are infested with rats or mice or both. The seasonal incidence corresponds fairly closely with that of relapsing fever except that there is a definite slight rise in the number of cases of typhus in the late summer and autumn ; this is believed to be due to the occurrence of cases of murine typhus. There were five proved cases of murine typhus. In one outbreak in a house and two in institutions typhus strains were isolated from rats, mice and fleas ; louse strains were also isolated which showed some of the characters of murine virus.

These appear to be the chief findings on which the authors base the view stated in the second sentence of this abstract.

An interesting table is given showing the incidence of various acute infectious and parasitic diseases among patients admitted to the hospital from July 1921 to June 1940. The figures are :—

Bacillary dysentery	2,549	Epidemic meningitis	205
Scarlet fever	937	Paratyphoid fevers	201
Kala azar	888	Epidemic encephalitis	178
Lobar pneumonia	822	Tetanus	119
Diphtheria	804	Whooping Cough	76
Typhoid fever	764	Acute poliomyelitis	67
Malaria	544	Cholera	65
Erysipelas	525	Smallpox	51
Typhus fever	491	Undulant fever	22
Relapsing fever	484	Rabies	21
Amoebic dysentery	351	Anthrax	13

John W. D. Megaw.

SONI (R. L.). **Typhus Fever in Burma. (With Record of Three Cases.)**—*Indian Med. Gaz.* 1942. Feb. Vol. 77. No. 2. pp. 79–81. With 3 charts.

Three isolated cases occurring in 1935, 1936 and 1940 respectively are reported. The place of occurrence was presumably Rangoon; in one case the diagnosis was "shop typhus" and the other two are apparently regarded as being of the same kind.

One patient had been engaged on an intensive rat drive within 12 days of onset; no lice were found in any case and there was no history of insect bite. In two of the cases a rash appeared on the sixth day, in the other no rash could be seen. The fever lasted from 13 to 17 days.

The serum reactions were :—

		Widal	Weil-Felix		
			Proteus OXK	*Proteus OX19*	*Proteus OX2*
Case 1,	18th day	—	+1 : 34	+1 : 340	+1 : 64
Case 2,	8th day	—	−1 : 50	−1 : 50	−1 : 50
	14th day	T+1 : 600 TO+1 : 100	+1 : 30	+1 : 375	+1 : 750
Case 3,	10th day	—	−1 : 50	+1 : 300	−1 : 50

The leucocyte count in the second case was 4,000 on the 8th day.

In one case prontosil album was given, but the dosage is not stated; the author remarks that if the drug was responsible for the comfortable course it had no appreciable effect on the temperature but rather could be held responsible for the anaemia which developed after its use. The haemoglobin in this case fell from 80 per cent. on the 6th day to 45 per cent. on the 14th day. *John W. D. Megaw.*

ALICATA (Joseph E.). **Experimental Transmission of Endemic Typhus Fever by the Sticktight Flea, Echidnophaga gallinacea.**—*Jl. Washington Acad. Sci.* 1942. Vol. 32. No. 2. pp. 57–60. [Summary taken from *Biol. Abstracts.* 1942. May. Vol. 16. No. 5. p. 1198. Abstr. No. 12883.]

The virus of endemic typhus (Wilmington strain) has been successfully transferred to sticktight fleas as a result of allowing the fleas to feed on an experimentally infected rat. An emulsion of the faeces of these fleas and an emulsion of the body of these fleas produced clinical typhus when inoculated into guineapigs. Clear-cut cross-immunity has been shown in guineapigs inoculated with the virus from the fleas and with a known endemic typhus virus (Wilmington strain). Histological examination of the brain of one of the guineapigs inoculated with the strain of virus recovered from the fleas revealed characteristic lesions of typhus fever. Agglutinins for *B. proteus OX19* were demonstrated in the serum of a rabbit inoculated with the strain of virus recovered from the fleas.

MANRIQUE (Jorge Boshell) & MONTOYA (Juan Antonio). Un nuevo foco de " Fiebre Petequial " del tipo de las montañas rocosas en Colombia. [**A New Focus of Spotted Fever of the Rocky Mountain Type in Colombia.**]—*Bol. d. Inst. Nac. de Hig. Samper Martinez.* Bogotá. 1942. Jan. 24. No. 5. pp. 21–23.

Twelve cases of fever, all fatal, occurred within three weeks towards the end of 1941 in a non-malarious locality in the southern part of the Santander province of Colombia.

Rats inoculated by the intracerebral route with the blood of one patient gave negative results, but guineapigs inoculated intraperitoneally showed distinct scrotal reactions in the second passage of the virus. Rickettsia bodies were cultivated in chick embryos. Two rhesus monkeys were incoculated, both died after two days of fever ; the incubation period was five days. Cross-immunity tests, no details of which are given, showed that the disease was immunologically identical with Rocky Mountain spotted fever and the spotted fever of Tobia and São Paulo.

The authors suggest that the disease probably occurs, without being recognized, in many other localities in Colombia.

John W. D. Megaw.

YELLOW FEVER.

ROCKEFELLER FOUNDATION. A REVIEW FOR 1941 [FOSDICK (Raymond B.)]. pp. 13–17. With 2 figs.—**Yellow Fever in 1941.**

Some very fruitful research has been carried out by the field staff of the Rockefeller Foundation on yellow fever during 1941, in particular jungle yellow fever. It is now over four years since *aegypti*-transmitted yellow fever was recorded on the American continents, but during 1941 outbreaks of the jungle form occurred in the Magdalena Valley, in the plains of Colombia, in the Cuyuni Valley in Venezuela, and in the Amazon Valley in Peru, Bolivia and Brazil, so that reinfection of areas infested by *Aëdes aegypti* is a constant menace. A species of *Haemagogus* has been known for some time to be a capable transmitter of the jungle yellow fever virus, but in the dry season this mosquito could not be found although cases of the disease continued to occur. The field staff investigated this problem and solved it by discovering that this mosquito is a tree-top dweller and may be found there when none was being caught at ground level. They found the virus present in tree-top mosquitoes, and this elucidates two important points : first, the way in which the virus may be carried over from one rainy season to the next, and second, the prevalence of jungle yellow fever among men engaged in felling trees. A second successful piece of work has been carried out in Western Uganda. Prior to 1941 blood tests had proved cases of acquired immunity in man, though no actual cases had been observed. In 1941, natives in the Ituri forest were becoming immune ; in other words, the virus was present there. Investigation then revealed a human case from which the virus was isolated, as it was also from a prevalent mosquito, *Aëdes simpsoni*, caught in the wild. *H. H. S.*

PLAGUE.

WHEELER (C. M.) & DOUGLAS (J. R.). **Transmission Studies of Sylvatic Plague.**—*Proc. Soc. Experim. Biol. & Med.* 1941. Vol. 47. No. 1. pp. 65–66. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Mar. Vol. 30. Pt. 3. p. 33.]

In mass feeding experiments with *Ceratophyllus* (*Diamanus*) *montanus*, Baker, and *Hoplopsyllus anomalus*, Baker, the predominant fleas on *Citellus beecheyi* in California, *C.* (*Malareus*) *telchinum*, Roths., from *Microtus californicus*, the rat fleas, *C.* (*Nosopsyllus*) *fasciatus*, Bosc, and *Xenopsylla cheopis*, Roths., and the cat flea, *Ctenocephalides felis*, Bch., plague was transmitted by each species except *Ceratophyllus telchinum* and *H. anomalus* appeared to be a poor vector. The infection, vector and transmission potentials of each species were then determined by individual feeding experiments on white mice. The infection potential is obtained by dividing the number of fleas that become infected (ascertained by daily faecal cultures during the life of each flea and subsequent histological examination) by the total number used, and the vector potential by dividing the number of infected fleas by the number that transmit infection ; the transmission potential is the number of transmissions (infected mice) per infective flea. The product of these factors represents the number of transmissions effected by an average individual or the vector efficiency. The results are given for *Ceratophyllus montanus* and *X. cheopis* ; the three potentials and vector efficiency were 0·85, 0·52, 2·58 and 1·14, respectively, for the former, and 0·98, 0·29, 1·44 and 0·39 for the latter. These figures show that to evaluate the efficiency of an Arthropod as the vector of an infectious agent, all three potentials must be taken into account.

STEWART (M. A.) & EVANS (F. C.). **A Comparative Study of Rodent and Burrow Flea Populations.**—*Proc. Soc. Experim. Biol. & Med.* 1941. Vol. 47. No. 1. pp. 140–142. With 2 graphs. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Mar. Vol. 30. Pt. 3. pp. 33–34.]

An investigation was carried out in a district of California heavily populated with *Citellus beecheyi* on the correlation between flea populations on the ground squirrels and at the openings of their burrows and on the seasonal composition of these populations. Cotton batting was placed in the mouths of 30 burrows, divided into three approximately similar groups of 10, and collections were made at weekly intervals from 29th April to 23rd October 1940, from the three groups in rotation, while ground squirrels were trapped alive, lightly anaesthetised and combed to remove all fleas at similar intervals over the same period. All but about a dozen of the 7,500 fleas taken were *Ceratophyllus* (*Diamanus*) *montanus*, Baker, or *Hoplopsyllus anomalus*, Baker. *C. montanus* was markedly predominant in the flea population from 29th April to 28th June, when the mean temperature was below 75°F. and *H. anomalus* from 11th July to 14th October when the mean temperature was above 75°F. No other correlation between atmospheric or burrow temperatures and flea indices was detected. The density of the flea population and its composition at the mouths of the burrows, as shown by the figures for groups of 10 openings, reflect with

a high degree of accuracy, though on a smaller scale, the flea indices of the host. It should, therefore, be possible by flea surveys from 10 or more burrow mouths to obtain information as to the appropriate time to begin prophylactic measures against sylvatic plague, the plague potentialities of an area based upon the species of fleas in it, and, presumably, the presence or absence of plague infections in the flea population and the likelihood of epizootics. Although *H. anomalus* can transmit plague under experimental conditions, it is probably not so efficient a vector as *C. montanus*. It is possible that in the past, areas have been recorded as free from plague infection because they were surveyed at a time when the predominant flea species were poor vectors or incapable of transmitting plague.

CHOLERA.

CAMPBELL-RENTON (Margaret L.). **The Recovery of Cholera Vibrios after Drying.**—*Jl. Path. & Bact.* 1942. Jan. Vol. 54. No. 1. pp. 121–125.

The early investigations of Koch indicated that cholera vibrios were easily killed by drying. This statement has to be qualified and refers strictly to a particular mode and rate of drying. In the present experiments the desiccation of drops of 24-hour peptone water cultures was carried through rapidly over P_2O_5 *in vacuo*. The samples froze by evaporation in 4–5 minutes. When the desiccated sample was sealed into an outer tube in which a vacuum was created, again over P_2O_5, it was found to be viable, or rather some organisms were found still to be viable, when the tubes were opened four years later. If the sealing was not perfect no recovery of organisms could be made. Although extraordinary viability is thus proved it is also shown that drying does cause death of large numbers of vibrios. Thus with a 24-hour culture and a colony count of 36,000,000 this count became at 2½, 5 and 14 minutes 9,200,000, 3,600,000 and 40,000 respectively. It is interesting to find that the haemolytic factor of El Tor vibrios was still preserved after four years even in cracked tubes, from which no viable vibrios could be cultivated. Recovery of viable vibrios from the desiccated material was best effected by plating out on blood or serum agar. Full tests were applied for the identification of the organisms recovered. *W. F. Harvey.*

GORDON (J.) & JOHNSTONE (K. I.). **Differentiation between Members of the Genus *Vibrio* by the Bactericidal Technique.**—*Jl. Path. & Bact.* 1942. Apr. Vol. 54. No. 2. pp. 221–225.

The serum of the guineapig is bactericidal for a number of organisms and it has been suggested by the authors that this property might be utilized for antigenic differentiation. They found that, after absorption with a particular organism, the bactericidal power was relatively more reduced for that organism than for other species or strains. "It was postulated that there must be in normal guineapig serum either a vast number of strain-specific antibodies capable of individual absorption or a general bactericidal antibody capable of being rendered relatively inactive against a particular organism or strain by contact with a large excess of that organism." The method has here been applied to

the differentiation of vibrios. The details of the relations of amount of inoculum, susceptibility of individual strains, degree of absorption of sera and maintenance of complement titre are commented on and evidently optimum relations are not easy to establish. "It has been possible to detect antigenic differences between the true cholera strains and related vibrios and to distinguish certain strains of *V. cholerae* which differ antigenically from the main group." *W. F. Harvey.*

BANERJEE (D. N.). **Cholera Toxin.**—*Jl. Indian Med. Assoc.* 1942. Jan. Vol. 11. No. 4. pp. 95–99. [29 refs.]

The method of obtaining the cholera toxin was that of dialysis through cellophane sacs and the use of Ramon's peptic digest of veal medium. This medium, which is buffered with sodium acetate (5–10 gm./litre), contains 0·2 per cent. glucose and maintains its *p*H with little change. Instead of having the medium both inside and outside the cellophane sac a trial was made with normal salt solution in the sac and dialysis was continued overnight. "Next morning it is found that the 'diffusate medium,' which was originally only saline, has taken a tinge of yellow colour of the Ramon's medium." Growth in the salt solution appeared to be just as luxuriant as in the nutrient medium. It was found important to use a large quantity of seed culture to obtain a satisfactory toxin. The method of preparation of toxin from the diffusate was not to filter through a candle, which reduces toxicity, but to centrifuge and then kill the residue of organisms in the supernatant fluid by passing a current of air, containing chloroform and toluol, through it. Little difference in toxicity seems to have been found, whether cultivation was aerobic or anaerobic, although the anaerobic culture appeared to be more potent by intraperitoneal injection. It was found that "all the animals receiving 2 c.c. of the filtrate from culture, both aerobic and anaerobic, died within 24 hours and nearly all died within 4 days. The minimum lethal dose is thus 1 c.c. of the filtrate." Intravenously the minimum lethal dose was 0·25 cc.

W. F. Harvey.

TOMB (J. Walker). **Cholera and Anuria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. Jan. 31. Vol. 35. No. 4. pp. 229–234. [18 refs.]

This paper contains much the same information as that already reviewed in this *Bulletin*, 1942, Vol. 39, p. 163.

BISHOP (T. H.). **Cholera and its Treatment.**—*Med. Press & Circular* 1942. May 27. pp. 348–350.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

STOKES (Roy J.) & ORTIZ (Jose). **Amebiasis. Study of 100 Cases in Puerto Rico.**—*Bol. Asoc. Med. de Puerto Rico.* 1942. Feb. Vol. 34. No. 2. pp. 64–68. [13 refs.]

The idea appears to be prevalent that amoebiasis in Porto Rico is of relatively minor importance. It is suggested that though this

dictum might apply to "amoebic dysentery" it cannot in any sense apply to amoebiasis.

The authors consider that *E. histolytica* may be responsible for a considerable proportion of abdominal complaints and have observed many cases treated as gastric ulcer, cholecystitis, chronic appendicitis and spastic colitis which in a few days responded to arsenical therapy.

It is claimed that, whilst granting that cysts in the stools do not always indicate active infestation, their presence requires treatment without fail. Out of a total of 1,478 clinic records 52 positive cases were found, an incidence of 3·5 per cent. Of these patients, together with 48 derived from other sources, 67 per cent. complained of abdominal pain, although only 10 per cent. had acute amoebic dysentery: the remaining 33 per cent. complained of general symptoms—malaise, heachaches, weakness and pallor. The great majority had abdominal pain accompanied by nausea, occasionally by alternating constipation and loose stools. Pain may be referred to the epigastrium, right upper, lower or left quadrants, and this localized pain may be accompanied by an increase of leucocytes with an average of 11,800, in the differential count the only noteworthy feature being the absence of eosinophiles.

The argument is illustrated by citation of two cases suggesting appendicitis with immediate response to carbarsone. In those cases exhibiting vegetative forms the following routine was followed:—If the stool was solid a saline purge was given and the third movement collected in a warm bedpan, and examined without delay; warm slides and coverslips were used.

The great majority were diagnosed on the presence of cysts—and for this purpose 5 grammes of faeces were macerated in 50 cc. of a 10 per cent. copper sulphate solution and stood for eight hours. This method renders the nuclei and chromidial bodies more apparent; the suspension should be of such concentration as to permit printed matter to be read through it.

Carbarsone treatment has proved entirely satisfactory. Amoebic abscess was not encountered. No surgical procedures should be undertaken on abdominal conditions until a thorough search for *E. histolytica* has been carried out.

[The proof-reading has been defective and the rendering of *histolytica* in the text has become varied and confusing.]

P. Manson-Bahr.

Beltran (Enrique) & Larenas (Raúl). Protozoarios intestinales en una comunidad escolar de la ciudad de México. [**Intestinal Protozoa of a School Community in Mexico City.**]—*Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1941. Sept. Vol. 2. No. 2. pp. 193–212. [12 refs.] English summary.

An examination for intestinal parasites of 410 pupils in a public boarding school in Mexico City has shown that 91 per cent. were infected with one or more intestinal protozoa. The infection rate for *Entamoeba histolytica* was 47 per cent. *C. M. Wenyon.*

Osburn (H. S.). **Metastatic Amoebiasis in Natal.**—*South African Med. Jl.* 1942. Feb. 28. Vol. 16. No. 4. pp. 89–90.

The author gives brief notes of eight cases of amoebic hepatitis (one patient subsequently had a "pinkish, almost anchovy coloured"

sputum) treated with emetine, all of which responded rapidly to the drug. All the patients complained of pain in the liver region and had adventitious signs at the lung bases, but two only showed an enlargement of the liver. Recently, from the King George V Hospital for Tuberculosis, Durban, seven cases of pulmonary amoebiasis have been reported and it is thought probable that a considerable number of such patients are recorded erroneously as suffering from tuberculosis of the lungs. *H. H. S.*

SILICEO AMBÍA (Luis). Los abscesos hepáticos amibianos y su tratamiento por el neosalvarsán. [**Treatment of Amoebic Liver Abscess with Neosalvarsan.**]—*Rev. Med. Veracruzana.* 1942. Apr. 1. Vol. 22. No. 4. pp. 3655–3656.

The author proposes his method for patients in whom emetine does not succeed or in whom it produces toxic symptoms. In the case he describes (and he states that he has had four such cases now) he operated, and after evacuating a large quantity of pus he introduced by a two-way cannula 500 cc. of distilled water containing 45 cgm. of neosalvarsan, repeating the process the following day. Six days later, fever and pain had disappeared and he was treated with liver extract and yatren, and the patient was able to leave hospital. [It seems a little misleading to call this " treatment with neosalvarsan," for the patient had had emetine, was operated upon, and had subsequent yatren and liver extract in addition to the specific drug.] *H. H. S.*

HAGA (J.). **Liver Abscess Perforating into the Right Lung.**—*Med. Jl. Australia.* 1942. Feb. 7. 29th Year. Vol. 1. No. 6. pp. 170–172.

BARMA (P. N. Sinha), ROY (R.) & BHATTACHARYA (T.). **A Liver Abscess bursting into the Peritoneal Cavity with Signs of Intestinal Obstruction.**—*Indian Med. Gaz.* 1942. Mar. Vol. 77. No. 3. p. 152.

KILE (Roy L.) & WELSH (A. L.). **Contact Dermatitis from Emetine Hydrochloride.**—*Arch. Dermat. & Syph.* 1942. Mar. Vol. 45. No. 3. pp. 550–552.

In 1924 M. M. PESHKIN recorded " urticaria and itching of hands and forearms from handling emetine solution." The authors mention two patients under their care who were employed in filling ampoules with emetine hydrochloride. The fingers showed vesiculation on a basal erythema in one case, and the fingers, cubital fossae and face in the other. Patch tests in both gave a faint erythema in 24 hours, but in 48 hours oedema and marked vesiculation in response to emetine hydrochloride and a mild erythema to U.S.P. solution of potassium arsenite (there was less than one part in 100,000 of arsenic in the emetine hydrochloride powder which was used for making the 4 per cent. solution for the ampoules). Ten persons were employed in the filling and three others of these (*i.e.* five altogether) had a dermatitis of the face, hands and neck. When removed from contact with the emetine all five recovered rapidly.

Attention is called to the necessity of waiting for 48 hours before expecting a marked reaction to the patch test with emetine.

H. H. S.

HARTMAN (Howard R.), KYSER (Franklin A.) & COMFORT (Mandred W.). **Infection of the Gallbladder by Giardia Lamblia.**—*Jl. Amer. Med. Assoc.* 1942. Feb. 21. Vol. 118. No. 8. pp. 608–609.

The case reported is that of a man 32 years of age who suffered from periodic attacks of diarrhoea associated with pain in the right upper quadrant of the abdomen. A giardial infection was discovered and a course of atebrin given. This gave only temporary relief of symptoms. When seen six months later the patient had lost much weight and was still exhibiting the same symptoms. A giardial infection was again noted. A diagnosis of chronic cholecystitis was made, and an operation was performed; the gall bladder appeared normal except for a slight thickening. There was oedema around the head of the pancreas, which contained an adenoma. The contents of the gall bladder were aspirated and in these giardia were discovered. No other surgical interference was carried out. The abdominal pain continued, and when recovery from the operation had taken place a course of atebrin was given. The giardial infection of the duodenum, as well as the symptoms, completely disappeared. *C. M. Wenyon.*

LEPROSY.

BURNET (Et.). Essais d'inoculation de tissus de lèpre humaine aux rongeurs. Quelle est la réceptivité du hamster? Le danger d'intrusion de la tuberculose. [**Inoculations of Leprous Material into Rodents.**]—*Arch. Inst. Pasteur de Tunis.* 1940. Sept. Vol. 29. No. 2 & 3. pp. 155–169.

The author gives a valuable résumé of the evidence on this question. He refers to his own failure to infect more than one of 14 hamsters inoculated with human leprous material and states that there is no clear evidence that hamsters are any more susceptible to such inoculations than other rodents [see this *Bulletin*, 1939, Vol. 36, p. 539]. He stresses the difficulty of excluding tuberculous infections, since some types of tubercle bacilli may fail to infect guineapigs. It is also impossible to determine whether lepra bacilli found in inoculated tissues are living or dead, and he points out that only the development of typical mass infection of lepra cells or globi can be taken to prove infection with living bacilli. The hamster is very susceptible to tuberculous infection. He concludes that we still lack any experimental animal that can at all constantly be infected with human leprosy.

L. Rogers.

DUBOIS (A.) & GAVRILOF (W.). Essais d'inoculation de la lèpre humaine au hamster non splénectomisé. [**Inoculation of Human Leprosy into Hamsters.**]—*Arch. Inst. Pasteur de Tunis.* 1940. Sept. Vol. 29. No. 2 & 3. pp. 170–173.

The authors report on the inoculation of 12 hamsters with leprous nodules sent by air from the Congo and used after nine days, and also four inoculated with fresh leprous material from a local case. The results in all were negative as regards human leprosy, but one animal showed infection with the Stéfansky rat leprosy bacillus, the origin of

which was not traced [compare this *Bulletin*, 1940, Vol. 37, p. 628]. They conclude that although their results do not invalidate occasional successes by previous workers, they do confirm the work of such observers as BURNET [this *Bulletin*, 1939, Vol. 36, p. 539] in showing that experimental infection with human leprosy of hamsters which have not been splenectomized is far from being commonly successful. [See also this *Bulletin*, 1938, Vol. 35, p. 293 ; 1940, Vol. 37, p. 627.]

L. Rogers.

BURNET (Et.). Essais d'inoculation des bacilles lépreux, B. de Stephansky, B. de Hansen, sur le poumon par instillation dans les narines. [**Attempts to inoculate Leprosy Bacilli by Nasal Instillations.**]—*Arch. Inst. Pasteur de Tunis.* 1940. Sept. Vol. 29. No. 2 & 3. pp. 174–178.

In attempts to find a method of experimental infection with lepra bacilli the author has tried the nasal instillation of mice and rats under anaesthesia. Stéfansky's bacillus should first be used. The results showed that mice were much more receptive than rats. In the animals in which lesions were produced the acid-fast bacilli were found in the tracheo-bronchial glands and also to some extent in endothelial cells in the lungs, but no nodules were present. In very few animals were the bacilli found in the spleen or liver, so there was no tendency to generalization. The author therefore concludes that inoculation by the respiratory route is not the method of choice for such work.

L. Rogers.

BÜNGELER (Walter). Gibt es eine kongenitale Lepra ? [**Is there a Congenital Leprosy ?**]—*Klin. Woch.* 1941. Nov. 22. Vol. 20. No. 47. pp. 1169–1171.

The author discusses this question in the light of his investigations in Brazil and the literature of the subject. Experience of the isolation from their birth of the children of leprosy parents throws light on the matter, for in India Canon GUILFORD recorded that very few children brought up by their leper parents escaped the disease, but after Canon JACKSON in the Punjab commenced separating young children from their infected parents very few developed the disease ; this indicated post-natal infection from their parents as the usual mode of contamination. The theoretical possibility of congenital infection is based on lepra bacilli being occasionally found in the blood of patients, especially during febrile reactions. There is also abundant pathological evidence that lepra bacilli may be present in the placenta, and they have also been demonstrated in semen and in the genito-urinary organs of infected males. Whether they can pass through the placenta into the blood vessels of the child to produce intra-uterine infection, however, is very difficult to decide. In most of the cases reported as congenital infections the child was not separated from the mother soon enough to exclude the possibility of post-natal infection.

The author has been able to observe 300 infants who were separated at a very early age, and kept under observation up to 13 years ; in none of them did leprosy symptoms appear. Moreover, he has made histological examinations of the organs of 60 infants of leprotic mothers

but was unable to demonstrate lepra bacilli in their bodies. He therefore concludes that congenital infections are so extremely rare as to be of no practical importance. Very early separation of infants from leper parents is therefore an effective preventive measure.

L. Rogers.

PESCE (Hugo). La cutirreacción histaminica de Pierini en los leprosos del Lazareto de Lima y los de Apurímac. [**The Histamine Skin-Test in Lepers.**]—*Guatemala Méd.* 1941. Sept. Vol. 6. No. 9. pp. 7–9.

This test, known in the Argentine as the Pierini test, is performed by placing on the skin a drop of a 1 : 1000 solution of phosphate of histamine in double distilled water, and puncturing lightly through it with an injection needle, without causing effusion of blood. The author tried it on five healthy subjects and 25 lepers from the Lima Lazaretto and the Apurímac Dispensary. The reaction comprises three stages, or degrees : (1) Local congestion of 1–3 mm. diameter appearing in 10–60 minutes ; (2) an erythematous areola of 20–30 mm., appearing in 1½–2½ hours ; and (3) an oedematous papule, 1–7 mm. in diameter, in 2–5 hours. Even so mild a reaction as stage (1) is interpreted as positive.

The results in this small number of cases and controls were : Negative in all the controls and in the healthy areas of the skin of lepers ; positive in all anaesthetic or maculo-anaesthetic areas of lepers (one case in which there was doubt as to the nature of the local lesion gave a positive result). The procedure is easy, as is the interpretation in most cases, and is regarded as useful in differentiating leprous maculae or hypochromic areas from those due to vitiligo or pinta and the like and is serviceable, therefore, in contacts presenting dubious lesions or suspicious spots.

H. H. S.

ALBERTO CASTRO (Carlos). Perforantes plantares. [**Perforating Ulcers of the Sole.**]—*Med. y. Cirugia.* Bogota. 1940. Oct. Vol. 5. No. 2. pp. 82–94.

Basing his views on the theoretical vasodilating action of acetyl-choline, the cicatrizing action of insulin and the effect of the latter in stimulating and fixing albuminoid substances in the human body and its other actions, the author has used acetyl-choline-insulin in the treatment of perforating ulcers of the foot in lepers.

His method is to give intramuscularly 1 cc. of acetyl-choline (equal to 10 cgm. of active substance) and on the following day 0·5 cc. insulin subcutaneously (equal to 10 units). He gives 6–8 injections of each, repeated after an interval of 10 days, then after each of successive rest-periods of 15, 20, 25 and 30 days, then increasing the rest-period by 10 days till cure is complete (so, for example, after the seventh series of injections there would be 40 days' rest). In early cases of perforating ulcer two or three series usually suffice. In some cases, the site is scraped and cauterized with 15–20 per cent. silver nitrate.

He has observed, even after the first course, that the tissues are recovering vitality ; the natural colour returns, the cyanosis disappears and the oedema is reduced together with pain, and the general state improves. Notes of four cases are given.

H. H. S.

HELMINTHIASIS.

ACKERT (J. E.). **Natural Resistance to Helminthic Infections.**—*Jl. Parasitology.* 1942. Feb. Vol. 28. No. 1. pp. 1–24. With 4 figs. [94 refs.]

In this address the author reviews and analyses the literature on such factors in natural resistance to helminth infections as diet, genetic constitution and age, and presents some new data on an inhibitory nematode growth factor in duodenal mucus of older animals. He uses the term natural resistance to designate a host's resistance, at any age, to its helminths as developed in the absence of helminthic antigens. Natural immunity is interpreted as representing a natural incompatibility between the host and an invading helminth ; whilst immunity is used to represent the host condition that is due to helminthic antigens.

Dietary factors in resistance to helminths.

Vitamins.—In 1927, the author made a survey of the intestinal helminths of 1,000 chickens in the vicinity of Manhattan, Kansas, and found that nearly half of them were infected with *Ascaridia galli.* Inquiry into the methods of rearing showed that the fowls in the garden season were usually confined to a pen in which no green food was available. The principal food of " kaffir or corn " was inadequate, and low in vitamins B and A. Previous work (1924–1927) had shown that the resistance of chickens to Ascaridia was affected by diets deficient in these vitamins and that natural resistance of animals to helminthic infection may be lowered by nutritional deficiencies. HIRAISHI (1926) in Japan gave pigs a vitamin A deficient diet and lowered their resistance sufficiently to parasitize them with the human Ascaris, and CLAPHAM (1933) working on the hatching and survival of the horse-ascarid, *Parascaris equorum,* in rats found vitamin A to be an important factor in resistance ; he also found that this vitamin is also a factor in the resistance of chickens to *Heterakis gallinae.* WRIGHT (1935) in experiments on dogs infected with ascarids found that the animals fed on vitamin A deficient diet harboured about five times as many worms as did controls fed on adequate diet and exposed to the same degree of worm infection. McCOY (1934) showed that vitamin A is an important factor in the reaction of rats to superinfections of *Trichinella spiralis* ; and LAWLER (1941) found that the absence of vitamin A lowered rats' resistance to a primary infection with *Strongyloides ratti* and weakened their immunity to reinfection with these parasites [see below, p. 632].

All this work indicates that a diet markedly deficient in vitamin A will lower the resistance of the host to its nematode parasites. The explanation of this fact has, however, not yet been completely elucidated. It is known that lack of vitamin A affects the normal functioning of epithelial membranes of parts of the respiratory, digestive and uro-genital tracts, and also those of the eyes and tear ducts. Whether the lining of the small intestine, which is the habitat of most of the adult nematodes studied, is affected, will require further investigation.

The work of VINCENT and ACKERT (1926) showed that vitamin B deficiency lowered the resistance of the fowl to Ascaridia, and later

work by ACKERT and NOFF (1931) showed that lack of vitamin B, which caused paralysis of the muscles of the digestive tract, resulted in the retention of a high percentage of Ascaridia, whereas the control chickens eliminated most of them. FOSTER and CORT (1931) lowered the resistance of dogs previously infected with *Ancylostoma caninum* by giving them a diet deficient in vitamins A and B and minerals. After the parasites had increased markedly in the dogs, they were given an adequate diet which increased their resistance and caused an extreme inhibition of the egg production of the worms.

Ackert records that among the early difficulties in rearing chickens in confinement was the development of a form of rickets caused by insufficient vitamin D. The investigations of ACKERT and SPINDLER (1929) showed that vitamin D protects the hosts against the effects of parasitism rather than by inhibiting the development of worms.

Other dietary supplements.—Returning to the case of the thousand chickens examined at Manhattan by Ackert in 1927, it was noted that the birds were kept much of the year on rations that were almost wholly of plant origin. Preliminary tests by Ackert indicated that the inclusion of skim milk as a supplement to the diet produced chickens that were unusually resistant to Ascaridia, and later work (1933) showed that a basal cereal ration, adequate in vitamins and minerals, when supplemented by meat meal and by skim milk produced the most resistant fowls; the cereal ration plus meat meal was second best, whereas the cereal ration supplemented by peanut meal (a wholly plant ration) produced the least resistance in the chickens to Ascaridia. These results were attributed to the wider range of the amino acids made available from the diets of the first two groups. The work of SHORB (1933) showed that the resistance of hosts to tapeworms is affected by diet. It might thus appear that any deficient diet that lowers the resistance of the host will permit the helminths to increase their development and productivity, but such is not always the case, as is shown by the inability of *Ascaridia galli* to grow in a host kept on a very deficient diet. ACKERT and WHITLOCK (1935), by giving chickens intramuscular injections of a nutrient solution lacking vitamins A and B and animal proteins, lowered the resistance of the chickens without enabling the worms to thrive in the bodies of the hosts. Although many of the injected chickens died of starvation and had their resistance completely broken down, fewer and shorter worms remained in them than in the controls fed on a normal diet. Such results indicate that there may be a critical point in the broken resistance of a host beyond which the environment becomes unfavourable for the helminth.

The inference from all this work appears to be that in general the natural resistance is lowered to helminths, both in the somatic and intestinal phases, when omnivorous hosts are maintained on diets deficient in vitamins A, B (complex), or D, or on rations with highly restricted sources of proteins.

Genetic constitution as a factor in resistance.

That natural resistance to helminthic infections may be due in part to the genetic constitution of the host is indicated both by epidemiological data and experimental results.

Epidemiological evidence.—MILLER (1908) observed that pure bred Zebu cattle in Trinidad resisted the ravages of strongyles better than did other breeds of cattle. Race differences in resistance to hookworms in

human beings were noted by SMILLIE and AUGUSTINE (1925) who found that white children were more heavily infected than negro children of the same ages living in the same community, and somewhat similar observations have been made by other workers in respect of hookworm, Ascaris and Hymenolepis infections. CRAM (1940) examined 3,371 children in nursery schools and summer camps, etc., for *Enterobius vermicularis*, and found that 41·9 per cent. of the white children were infected as compared with 15·5 per cent. of the negroes. It would thus appear that negroes in the Southern States of America have greater natural protection against helminths than have the whites. This is especially true of hookworms and pinworms. It is difficult to conceive of the negroes living on a higher plane, either from the standpoint of nutrition or of sanitation. On the racial immunity hypothesis, the long association of the negroes with the worms would confer greater opportunity for the development of a grade of immunity, but whether this would become inheritable by mutations or by other means is problematical.

Experimental evidence.—Ackert and his colleagues (1933) found significant differences in the natural resistance of breeds of chickens to *Ascaridia galli*. Such heavy breeds as Rhode Island Reds, White Plymouth Rocks and Barred Plymouth Rocks had fewer and smaller Ascaridia than did the lighter White Leghorns and White Minorca breeds. CURTIS *et al.* (1933) showed that some strains of rats reacted more often to the production of tumours by *Cysticercus fasciolaris* than did others. After mentioning other work of a similar nature, Ackert states that he had obtained additional evidence of genetic strains within a breed by selecting the more resistant cockerels and pullets from one flock of chickens and thereby developing a strain of White Leghorns which was more resistant to Ascaridia than were a cockerel and six hens taken at random from another flock of the same breed. Work of this sort suggests that it would be possible to establish by selection a strain of chickens which is quite resistant to Ascaridia as well as one which is distinctly susceptible to this nematode. CAMERON (1935) found that Cheviot sheep on an overcrowded pasture were more tolerant of the effects, and less heavily parasitized with, nematodes than were the lowland breeds such as the Border Leicester. Differences in breed resistance of sheep to *Ostertagia circumcincta* were noted by STEWART *et al.* (1937). The work of GREGORY *et al.* (1940) suggested that genetic selection would effectively change the degree of resistance or susceptibility to strongyles in populations of sheep.

Age resistance to helminthic infections.

Here again, the evidence is both experimental and epidemiological.

Experimental evidence.—The first experimental evidence of age as a factor in natural resistance to helminthic infections appears to be that of LOOSS (1911) who found that some of the hookworm larvae fed to young dogs were able to reach maturity, whereas this did not happen in the case of adult dogs. RANSOM (1930) obtained similar results with a pig Ascaris and also with *Syngamus trachea* in chickens. HERRICK, working in Ackert's laboratory, noted a gradual increase in the resistance of chickens to Ascaridia as they became older, until the fowls reached the age of 103 days, after which no further increase was observed. Herrick (1928) also demonstrated age resistance of dogs to

hookworms. Similar evidence has been obtained in respect of *Nippostrongylus muris*, *Heterakis spumosa* and the lung worms, *Dictyocaulus filaria*. The tapeworms likewise encounter more resistance in older hosts than in younger ones; and AMEEL (1934) has reported an increased resistance with age in snails to larval flukes. Further evidence of host age resistance to flukes has been presented by CABLE (1937) experimenting with metacercariae and gulls. There is thus considerable experimental work indicating that the phenomenon of increased resistance with age may occur in mammalian, avian, amphibian and molluscan hosts to trematode, cestode or to nematode helminths.

Epidemiological evidence.—In 1934, KELLER *et al.* showed that after 15 to 19 years of age people develop a resistance to hookworms. They found that the worm incidence fell off rather sharply after the age of 24. In the case of the human Ascaris, the evidence of age resistance has long been known. The peak of infection percentages in the Southern States appears to be in the age group 7 to 14 years; the group of 15 to 19 years manifests much lower percentages of infections. Similar evidence has been obtained in the case of *Enterobius vermicularis*. Clinical manifestations of schistosomiasis were found by FISHER (1934) to be especially common in Belgian Congo children under 10 years of age, but never in persons over 30 years old. There is thus epidemiological evidence that host resistance to many species of nematodes and to some cestodes and trematodes increases with age.

The author then passes to a consideration of the various theories which have been advanced to explain age resistance, and discusses in some detail the recent work of EDGAR and himself (1938) on duodenal mucus and age resistance. Histological studies of the duodena of chickens showed that there were some differences in thickness of muscular layers, but the most striking difference was the increasing number of goblet cells in the chickens as they grew older. Experiments showed that the duodenal mucus contained a factor which was unfavourable to the growth of young *Ascaridia galli*, and the general conclusion of the work is that although the nature of the natural resistance of older animals has not been completely elucidated, there are indications that duodenal mucus from goblet cells contains a thermostable substance which inhibits the development of intestinal helminths.

W. Yorke.

OLIVER-GONZÁLEZ (José). **The Dual Antibody Basis of Acquired Immunity in Trichinosis.**—*Jl. Infect. Dis.* 1941. Nov.–Dec. Vol. 69. No. 3. pp. 254–270. With 1 chart. [22 refs.]

LU (Chao). **A Survey of the Parasites of Dogs, Cats and Rats made at Chengtu, Szechwan, China.**—*Chinese Med. Jl.* 1941. June. Vol. 59. No. 6 & Sept. Vol. 60. No. 3. pp. 550–564; 244–263. [50 refs.]

The parasites of direct or indirect interest to man were present in 60 dogs, 100 cats and 30 rats in the following percentages:—Dogs: *Echinococcus granulosus* 1·7, *Dipylidium caninum* 63·3, *Toxocara canis* 21·7, *Ancylostoma brasiliense* 45·0. Cats: *Clonorchis sinensis* 35, *Paragonimus westermanii* 24, *Taenia crassicollis* 63, *Diphyllobothrium mansoni* 55, *D. caninum* 22, Sparganum 11, *Belascaris cati*, 59, *A. caninum* and *A. brasiliense* 49. Rats: *T. crassicollis* 46·7, *Hymenolepis diminuta* 30, *Strongyloides ratti* 13·3, *Gongylonema neoplasticum* 3·3 but with no cancer.

Clayton Lane.

BUTLER (Robert L.), Jr. & CHRISTENSON (Reed O.). **A Simple Apparatus for determining the Viability of Embryonated Helminth Ova.**—*Jl. Parasitology.* 1942. Apr. Vol. 28. No. 2. pp. 131–134. With 2 figs.

CARLISLE (Vance). **The Pathology of Schistosomiasis of the Appendix and its Relation to Appendicitis.**—*South African Med. Jl.* 1942. Jan. 10. Vol. 16. No. 1. pp. 17–23. [10 refs.]

"The histology of schistosomiasis of the appendix is closely allied to that of tuberculosis, syphilis and other types of infective granulomata which, no matter where they occur in the body, are accepted as true examples of chronic inflammation. In view of these facts, therefore, it is suggested that the chronicity of this disease in the appendix be more universally recognized, as it is in the other viscera, and that the specific pathologic term of chronic Bilharzia appendicitis be applied for the purpose of diagnosing such lesion.

"Clinically, the condition may be devoid of characteristic features. . . .

"Acute and subacute exacerbations frequently occur in chronic Bilharzia appendicitis. . . . An acute diffuse appendicitis may follow increased intralumen pressure with consequent interference to the blood-supply or result from the destruction of the base of a crypt by the necrotising action of an ovum. It would seem probable that such acute inflammations, occurring in appendices already badly damaged by Bilharzia lesions, are frequently attended by very severe suppurative and gangrenous processes and often by perforation."

ESPÍN (José). Hallazgo de corpusculos semejantes a los de Negri, en un caso de mielitis bilharziana. [**Negri-like Bodies in Case of Bilharzial Myelitis.**]—*Rev. Policlinica Caracas.* 1941. Sept.–Oct. Vol. 10. No. 60. pp. 327–336. With 6 figs. English summary (7 lines).

The following is a translation of the author's summary :—

In this note are described certain structures resembling Negri bodies, which stain red, like Negri bodies, with Mann's stain and occupy the same situations in the interior of the nerve cells. The patient was suffering from myelitis due to the eggs of *Schistosoma mansoni.*

The bodies, which are named pseudo-Negri bodies, were found in the motor neurones of the affected medullary zone.

C. W.

BONNE (C.), BORSTLAP (A. J. P.), LIE KIAN JOE, MOLENKAMP (W. J. J.) & NANNING (W.). Voortgezet bilharzia onderzoek in Celebes. [**Continued Bilharzia Investigation in Celebes.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1942. Jan. 6. Vol. 82. No. 1. pp. 21–36. With 13 figs. on 2 plates & 1 chart. English summary.

Simultaneously with the echinostomiasis researches in the lake region of Celebes there has been carried on an investigation into Schistosome infection in man and animals. At Lake Lindoe it was discovered that the village dogs used in hunting pigs and deer were infected, like the deer, with *Schistosoma japonicum.* No difference could be detected between human, dog and deer worms. They were present in the mesenteric veins of small and large intestine and in the blood vessels of the liver. In deer specially large specimens of worms were found up

to 3 cm. in length. It was difficult to obtain faeces from the half-wild dogs, but three positive results were obtained in 3 out of 6 samples. Autopsy on one dog furnished dozens of worms. No Schistosome eggs were found in the faeces of buffaloes or horses.

The search in the Lake Lindoe region for the transmitter has been continued, especially for snails of the genus Oncomelania, which are known to spread *Schistosoma japonicum* in China and the Philippines. These were never found, nor was any snail discovered shedding furcocercous cercariae. It is interesting to note that although on Lake Lindoe no cercariae with forked tails which looked like *Schistosoma japonicum* cercariae have been found, a number of old Lymnaea snails in a lagoon of Lake Poso were found with such forked tail cercariae. These developed into Bilharzia worms in the mesenteric veins of mice but the worms could not be identified as *Schistosoma japonicum*. It may so far be concluded that this Lymnaea is either the carrier of *Schistosoma japonicum* or of an unknown schistosome. This will require further investigation. Some details are given of the morphological characters of the worms found in man, dog and deer.

Autopsies were carried out on one dog, two deer and one man. "The intestines did not show any bilharzial ulceration. In the human autopsy the liver and spleen were enormous, weighing 2300 and 3200 gm. respectively. The Lindoe district is malarious however. . . . The microscopical picture was identical in all three kinds of hosts. Eggs were . . . present . . . in the intestinal wall, especially in the submucosa and also in the liver. There were also some eggs visible in the lung capillaries." *W. F. Harvey.*

BONNE (C.), BORSTLAP (A. J. P.), LIE KIAN JOE, MOLENKAMP (W. J. J.), DE MOOR (C. E.) & NANNING (W.). Voortgezet onderzoek over echinostomiasis in Celebes. [**Continued Investigation of Echinostomiasis in Celebes.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1942. Jan. 6. Vol. 82. No. 1. pp. 3–20.

The object of these researches was to determine the extent to which the echinostome infections on the central Lake Lindoe shore occurred also among the inhabitants round other lakes in Celebes and what were the molluscs transmitting the infection.

i. *The occurrence of echinostomiasis on the lakes and coast of Celebes.*—There could be no accident about the human echinostomiasis round Lake Lindoe. It was not merely a localized example of a generalized infection of animals, as is the case in Java, where the reservoir host is the field rat, which probably infects the mollusc and reinfects itself by ingestion of the mollusc. Man, in that case, is not necessary. He only provides the opportunity for rats and snails to come together by means of his rice fields, while he himself only contracts infection as an incident if he ingests the snails. On Lake Lindoe, however, there exists such a high degree of infection of the transmitting molluscs (the snail *Anisus sarasinorum* as the first host and mainly the mussel *Corbicula lindoensis* as second intermediate host) close to human dwellings compared with more distant places, that the human being must be regarded there as the chief source of infection of the molluscs. The infective adjustment there is one of man, snail and mussel to one another.

The lakes in Celebes are of two types, one in the mountainous regions and the other in the plains. Lake Lindoe is one of the mountain lakes.

A detailed consideration is given to each lake in turn. In the case of Lake Lindoe the inhabitants are fairly highly infected, an infection contracted by eating the insufficiently cooked mussel, *Corbicula lindoensis*. Besides the mussel, *Viviparus rudipellis* [a pulmonate snail] is also heavily infected, but this infection is not necessarily through man ; it can be effected through the rat, mouse, duck or pigeon. The host is *Anisus sarasinorum* which is present in enormous numbers in the lake. The mussels and also the Viviparus, as second hosts, carry the metacercariae of *Echinostoma lindoensis* [*? lindoense*] with 37 spines, and also another with 45 spines. The adult of the latter is not known in man in Lindoe and its host is probably the rat, so that it may in fact be the fluke *Euparyphium murinum*. For this also *Anisus sarasinorum* is the first host. Finally it is apparent that *Pila ampullacea*, which is probably only an extremely large form of the usual *Pila conica*, carries metacercariae of the fluke *Euparyphium ilocanum* just as it does, not only in Celebes, but also elsewhere in the Netherlands Indies and in the Philippines. Feeding of Pila to rats infests them with Echinostoma having 51 spines, the number of spines appropriate to *Euparyphium ilocanum*, with which also the morphology of the worm is in agreement. Here also on Lake Lindoe, the rat is the normal host for *Euparyphium ilocanum* although natural infection has not been demonstrated.

The mollusc fauna of the coast region of Celebes is to be compared in many respects with that of Java. In the coast region as well as in the high and low-lying lakes a Pila infection with *Euparyphium ilocanum* is met with, and Viviparus is sometimes infected. The condition is much like that in Java where this type of infection occurs among the ricefield snails.

Among the mountain lakes Lindoe has a special position in its infection of human beings by *E. lindoensis* with first and second intermediate hosts *Anisus sarasinorum* and *Corbicula lindoensis* respectively.

ii. *Search for a reservoir host for E. lindoensis.*—In man up till now only *E. lindoensis* with 37 spines had been found, but the Lindoe mussels carry metacercariae of two kinds, one with 37 spines and one with 45 spines. Where does that with 45 spines come from ? Summarizing, it can be said that :—(1) On Lake Lindoe no reservoir host rat, duck or other water bird, is known for *E. lindoensis* (with 37 spines) but that on Lake Poso an old rat was once found infected with adult echinostomes which could not be differentiated from *E. lindoensis*. (2) The host for the echinostome with 45 spines, of which the metacercariae live in the Lindoe mussels, is still unknown. (3) The reservoir host for *E. ilocanum* on Celebes, as in Java, is the rat, at least in the coast region.

Tabulation of all the material facts especially as regards species, locality, frequency, material and experimental infection, etc., for molluscs, cercariae and metacercariae is given in conclusion to this article. *W. F. Harvey.*

BEUKEMA (W.). Een infectie met *Hymenolepis nana*. [**Infection with** *H. nana*.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1941. Sept. 23. Vol. 81. No. 38. pp. 2014–2020. [11 refs.] English summary.

" Description of an infection with Hymenolepis nana in an Indo-Chinese man of 24 years. OEY DJOEN HOAT found this tapeworm in Long Iram in two Dayaks (a woman and a girl of 6 years). A short

survey is given about the particulars of the worm, as described in the literature. The patient had practically no symptoms.

"The cure with semen cucurbitae (laboe merah) is recommended as pleasant and effective in comparison with oil of chenopodium, which failed in this case."

CLAPHAM (Phyllis A.). **An English Case of** *Coenurus cerebralis* **in the Human Brain.**—*Jl. Helminthology.* 1941. Dec. Vol. 19. Nos. 3/4. pp. 84–86.

This is believed to be the second instance of the recognition of *Coenurus cerebralis* in the brain of man; the fact that it was discovered by accident suggests that it may be commoner than supposed.

A man of 39 was discharged from the Royal Navy in 1932, his service having covered the Mediterranean where the infection is widely distributed (though it is common enough in animals in England); he had also visited the West Indies. He began to have severe headaches in 1936, which may point to his having got the infection in Britain, and in one attack he became comatose and died. Severe haemorrhages were found in the pons; the lateral ventricles were somewhat enlarged (he had had cerebrospinal fever at 16); "in the posterior horn of the lateral ventricle was situated a well developed matured coenurus" of typical appearance and having over 700 scolices in groups of 10 to 80 in each. About half were atypical—triradiate, tetraradiate, with six to eight suckers and one or two rostella. The hooklets were rather small. One rostellum was completely unarmed, others had ill-formed hooklets, some having only blade and guard, some being merely irregular masses of chitinoid. The specimen is in the museum of the London School of Hygiene and Tropical Medicine. *Clayton Lane.*

CULBERTSON (James T.) & GREENFIELD (Sylvia H.). **Effect of Atabrine upon Experimental Cysticercosis of Mice.**—*Jl. Pharm. & Experim. Therap.* 1941. Oct. Vol. 73. No. 2. pp. 159–161.

"The experiment presented above shows rather clearly that atabrine either prevents or retards the development of *Cysticercus fasciolaris* in the albino mouse. It should be borne in mind, however, that the effect obtained may be largely prophylactic, since the atabrine was first given prior to the infection of the mice. In additional experiments which have not been included in this report, the administration of the drug was withheld for several weeks until the cysticerci had become established. Under this circumstance, the effect of the atabrine was distinctly less, and usually was not significant. The application of drug therapy to human cysticercosis or to a related cestode infection, echinococcus (hydatid) disease, must evidently await the discovery of a substance more effective than atabrine appears to be upon the established cyst. It seems possible that one of the other acridine derivatives might serve this purpose."

ALLISON (B. J.). **Treatment of Acute Carbon Tetrachloride Poisoning: Report of Two Cases.**—*Ann. Intern. Med.* 1942. Jan. Vol. 16. p. 81. [Summary taken from *Jl. Amer. Med. Assoc.* 1942. May 9. Vol. 119. No. 2. p. 226.]

Allison cites 2 cases of acute carbon tetrachloride poisoning, 1 in a 9 year old boy from inhalation and 1 in a man of 48, an alcoholic addict,

who died ten days after drinking cleaning fluid. During the ten days symptoms and signs of extensive damage to the liver, kidneys and gastro intestinal tract were present. A necropsy confirmed the clinical manifestations. The boy had smeared red chalk on the covers of his bed, and in the process of cleaning it up with a tin of cleaning fluid he discovered that he liked the odor of the fluid and the way it made him feel. He poured a considerable amount on the blanket, replaced the tin and crawled into bed. He said that he saw stars and then couldn't remember anything. A few minutes later the boy was found under the covers, completely unconscious and breathing noisily. He was completely anesthetized for more than two hours. It is possible that there was some absorption through the skin. Definite evidence of hepatic damage occurred the next day: enlargement, tenderness and pain in the liver, a trace of bile in the urine, a high fever and leukocytosis. The importance of early intravenous administration of calcium and dextrose was not appreciated, and as the blood calcium was high calcium was given only by mouth. There was little evidence of renal damage. Hepatic tenderness persisted for two weeks and enlargement for a month. These physical signs and an evening fever, an increase in the polymorphonuclear leukocyte count and a slight elevation of the blood sedimentation rate indicated that repair was not complete in three weeks. During the next six weeks an elevation of temperature to between 100 and 101° F. on slight exertion indicated continued disturbance, as no other cause could be found for this fever. The author suggests the following outline for the treatment: removal of all unabsorbed carbon tetrachloride from the gastrointestinal tract, forcing of fluids by mouth and intravenously, prevention or treatment of signs of intoxication and organic damage, transfusion of blood or blood plasma if much blood has been lost, repetition of the chemical study of the blood until it returns to normal and complete rest in bed until evidence of hepatic and renal damage has disappeared. Carbon tetrachloride poisoning presents a definite health hazard. The proper labelling of products containing it should be required by law, and writers of textbooks should consider carbon tetrachloride poisoning a disease entity and thus make its nature and treatment known.

LAWLER (H. J.). **The Relation of Vitamin A to Immunity to Strongyloides Infection.**—*Amer. Jl. Hyg.* 1941. Nov. Vol. 34. No. 3. Sect. D. pp. 65–72. [24 refs.]

"Rats observably deficient in vitamin A were found to have lower resistance to a primary infection and less immunity to reinfection with *Strongyloides ratti* than did control animals. The weakening of the defensive functions of specialized epithelia did not seem to account for this increased susceptibility to worm parasitism. Therefore, some additional element of the immune mechanism appears to be weakened in the deficiency; this element may possibly involve an intimate relation between vitamin A metabolism and the reticulo-endothelial system." [See also ACKERT above.]

GIBBINS (E. G.). **Notes on Ethiopian Simuliidae III.**—*East African Med. Jl.* 1941. Oct. Vol. 18. No. 7. pp. 210–218.

MOORTHY (V. N.). **Life History of** *Dracunculus medinensis.*—Reprinted from *Indian Jl. Surgery.* Vol. 3. No. 4. 8 pp. With 11 figs. on 1 plate. [17 refs.]

MOORTHY (V. N.). **Guinea-Worm Cyst—a Case Report.**—Reprinted from *Indian Jl. Surgery.* Vol. 3. No. 4. 4 pp. With 1 fig.

This lad was treated for separate guineaworm infections in 1929, from 1931 to 1934 and again in 1936. He was the only one of a family of 14, which for several generations had been using the same infected step well, who got this infection repeatedly.

In 1929 a degenerate worm was extracted with difficulty and in bits from an unstated site. In 1933 a swelling appeared in the left lower popliteal region and by 1934 had reached the size of a big coconut, being slightly movable and having over it movable but ulcerated skin. Fluid aspirated from it contained dead and partly calcified Dracunculus larvae. Its removal was followed for two days by fever, persistent vomiting and urticaria, probably caused by escape of some fluid during the operation, and was cured by calcium and adrenalin. When it was opened there was disclosed a partly calcified worm lying in a fibrous tunnel, scrapings from whose walls showed that eosinophils formed 82 per cent. of its cells, their percentage in the blood being 13. In 1936 a blister appeared about the right ankle, ethyl chloride spraying made the worm empty her uterus after four days, and she was got away partly by traction and partly by cutting. *Clayton Lane.*

JOB (T. J.). **Food and Feeding Habits of the Glassfishes** (*Ambassis* **Cuv. & Val.) and their Bearing on the Biological Control of Guinea-Worm and Malaria.**—*Indian Jl. Med. Res.* 1941. Oct. Vol. 29. No. 4. pp. 851–862. With 2 figs. [25 refs.]

The glassfishes comprise some of the smallest perches; most are marine but some half-dozen species acclimatized to fresh water are found all over India and Burma. *Ambassis nama* (Ham.) and *A. ranga* (Ham.) are the most widely distributed species and are found in both standing and running waters. In an interesting paper the author describes the analyses of the gut-contents of 268 *A. nama* and 313 *A. ranga*, field experiments to determine their capacity to check mosquito breeding and to reduce the density of Cyclops, and feeding experiments in an aquarium. The results of all these observations show that glassfishes may check mosquito breeding, but only to a small extent, and that most of the mosquito larvae consumed are Culicines from the subsurface. They subsist mainly on minute Entomostracans found abundantly in the mid-water plankton. Cyclops form a high percentage of their natural diet, sometimes almost to the exclusion of other elements, so that these fishes, with their specialized gill arches adapted for filtration, stand out as voracious feeders on Cyclops throughout their life. It would seem that they may have an important rôle to play in the biological control of guineaworm disease. *Norman White.*

SLIWENSKY (M.). Drei Fälle von Gongylonema pulchrum bei Erwachsenen in Bulgarien. [**Three Cases of** *G. pulchrum* **Infection in Bulgaria.**]—*Deut. Trop. Ztschr.* 1941. Dec. 1. Vol. 45. No. 23. pp. 712–714.

The author refers to the fact that Gongylonema is normally a parasite of cattle, sheep, goats and pigs, and that the larval stages are

passed in members of the genera Blatta, Blaps, Tenebrio, Aphodius and Ontophagus. Although he does not regard this infection as a direct cause of cancer, he adheres to the opinion that it has some influence in this respect. He records three cases of human infection, all in young people. In two the worms were found beneath the mucous membrane of the lip and gum. The worms were identified by FÜLLEBORN or REICHENOW. Symptoms included itching, sensation of a foreign body, and slight pain induced when hot drinks were taken. *C. W.*

ASHBURN (L. L.). **Appendiceal Oxyuriasis. Its Incidence and Relationship to Appendicitis.**—*Amer. Jl. Path.* 1941. Nov. Vol. 17. No. 6. pp. 841–856. [29 refs.]

Threadworms are found as often in normal appendices as in those that show chronic inflammation and more often than in those that are acutely inflamed.

Each appendix was sectioned in three blocks—proximal, mesial and distal—and sections were examined from each. The author's conclusions are as follows :—

" 1. In a series of 2,317 surgically removed appendices, oxyurids were found in 184 (7·94 per cent.). Seventy-nine were positive in the sectioned material and in 105, oxyurids were found only by examination of the removed appendiceal contents.

" 2. Of the 34 appendices showing oxyurids in section and having fecal material in all three blocks, only one level was positive in 23 cases (67·65 per cent.), two levels were positive in 7 (20·58 per cent.) and all three levels were positive in 4 cases (11·76 per cent.).

" 3. The incidence of appendiceal oxyuriasis was found to be 2·88 per cent. for the white beneficiaries of the United States Public Health Service hospitals, 10·04 per cent. for Indians of the United States, and 23·91 per cent. for Eskimos and Aleutians.

" 4. The highest incidence occurred in the 7 to 11 year age group being (for the entire series) 15 per cent. for males and 22·22 per cent. for females. The decrease in incidence was gradual until the 32 to 36 year period at which a second peak occurs, 7·44 per cent. for males and 15·96 per cent. for females. Appendiceal infestation is rare after 51 years of age.

" 5. Infestation is more common in appendices from females than from males. For the 2 to 46 year age period, the ratio is 1 male to 2·34 females.

" 6. Comparison of infested and control (negative) appendices showed that local eosinophilia is not significantly increased by infestation with oxyurids.

" 7. Oxyuriasis occurs as frequently in normal appendices as in appendices showing chronic inflammation and more frequently than in acutely inflamed appendices.

" 8. Of the 79 cases showing oxyurids in the lumen of the sectioned appendix, 13 showed the worm in contact with mucosa ; 7 of these showed pressure atrophy of epithelium with formation of shallow crescent-shaped depressions. Rarely there was a little karyorrhectic necrosis, but no inflammation or hemorrhage was found.

" 9. One appendix showed an oxyurid in the deep part of the mucosa. The lack of inflammation, necrosis or hemorrhage shows that the invasion occurred postoperatively.

" 10. No case of ' appendicitis oxyurica ' occurred in this series. *Enterobius* (*Oxyuris*) *vermicularis* is not etiologically related to appendicitis."

Clayton Lane.

OFFUTT (Edward P.) Jr. & McCOY (O. R.). **The "Gopher" *Citellus richardsonii* (Sabine), as an Experimental Host for *Trichinella spiralis*.**—*Jl. Parasitology.* 1941. Dec. Vol. 27. No. 6. pp. 535–538.

"The 'gopher,' *Citellus richardsonii* (Sabine), was found to be very susceptible to infection with *Trichinella spiralis*. Ten of 14 animals fed doses as small as from 2 to 5 larvae per gm. of body weight succumbed. Adult worms persisted in the intestines of most animals for long periods of time, 13 weeks being the maximal period observed. Five 'gophers' that were reinfected showed no resistance to the test doses of larvae that were employed."

DEFICIENCY DISEASES.

BOWE (J. C.). **Alcoholic Beriberi Heart.**—*Lancet.* 1942. May 16. pp. 586–587.

Two cases are here recorded, one almost certainly a case of beriberi heart, the other probably since it cleared up on administration of vitamin B_1. The former was a warrant officer, 33 years of age, with painful and swollen legs and dyspnoea on slight exertion; he had been a year in Iraq and another in Aden and was a fairly heavy drinker, to six pints or more of beer daily. The heart was enlarged, the second sound reduplicated and bruits were audible over the carotids, blood pressure 122 and 48. Ankles were oedematous, leg muscles tender, patellar and ankle reflexes not elicited, plantar sluggish. He was given vitamin B_1 (Benerva) 5 mgm. b.d. intramuscularly the first day of treatment, thrice the next day, and 1 mgm. t.d. for the next six days, or 43 mgm. in all; Bemax and marmite were also given, and when the Benerva was stopped two tablets of Betaxan, thrice daily, were substituted. In about nine weeks the patient was able to undertake light duty, and the reflexes had returned, though some tenderness on pressure of the leg muscles persisted. Three weeks later he returned to full duty.

The second case was similar as regards the cardiac signs, but there was no indication of neuritis and the author classes it as belonging to Aalsmeer and Wenckebach's third group in which patients are seriously ill with "vomiting, dyspnoea, restlessness, epigastric pain, enlarged heart, dependent oedema, engorged veins, tachycardia and low diastolic pressure." [Diagnosis made on the result of treatment is not always safe, and investigation of the diets of the units from which these patients came revealed no lack of vitamin B_1.] *H. H. S.*

KERLEY (C. G.) & LORENZE (E. J.). **Beriberi in a Male Child Two and One-Half Years of Age.**—*Jl. Pediatrics.* 1941. Vol. 19. pp. 526–528. [Summary taken from *Nutrition Abstracts & Reviews.* 1942. Apr. Vol. 11. No. 4. p. 646. Signed L. WILLS.

A child of 2½ years fed for several months largely on a milled white cereal showed no physical abnormality except the symptom complex of pseudo-muscular dystrophy and acute peripheral polyneuritis. The treatment consisted of regular meals containing milk, meat, eggs, vegetables and fruit, with 15 mg. 50 per cent. percomorph oil daily, and 50 mg. nicotinic acid in divided doses daily for 3 days, subsequently

reduced to 12·5 mg. daily. Cure was apparent in 11 days and a year later the child was normal. Nicotinic acid was used instead of vitamin B_1 because it had already been found potent in neuritic disorders in children.

BEAN (William Bennett), SPIES (Tom Douglas) & BLANKENHORN (Marion A.). **The Incidence of Pellagra in Ohio Hospitals.**—*Jl. Amer. Med. Assoc.* 1942. Apr. 4. Vol. 118. No. 14. pp. 1176–1179. With 1 chart. [11 refs.]

In order to determine the incidence of pellagra in the Northern United States, admissions to two general hospitals in Ohio—Lakeside Hospital, Cleveland, and the General Hospital, Cincinnati—have been examined statistically. It was found that the disease is in fact widespread, contrary to older belief, and that it accounted for 1 to 2 per cent. of total admissions. Variations in reported incidence in the past have been due to variations in recognition of the disease. This is of course especially true of non-recognition of cases exhibiting minimal deficiency symptoms.

Curves showing the seasonal incidence in this northern State are given, and it is of interest to note that the alcoholic and secondary cases in Ohio follow the same trend in seasonal variation as endemic cases in the southern States, thus suggesting the essential unity of pellagra of endemic, alcoholic and secondary origin, and that other features than summer sunlight are important in this seasonal tide. [This is an interesting confirmation of the views put forward by the reviewer a number of years ago.] *H. S. Stannus.*

TROWELL (H. C.). **A Case of Pellagra of the "Infantile" Variety in a Ruanda Adolescent showing Signs of Deficiencies of Nicotinic Acid, Riboflavin and Nutritional Macrocytic Anaemia.**—*East African Med. Jl.* 1942. Jan. Vol. 18. No. 10. pp. 289–294. [15 refs.]

The description of an interesting case exhibiting the symptoms commonly recognized in East Africa as those of infantile pellagra. A native of Ruanda, aged about 15 years, showed glossitis, gastro-enteritis, crazy-pavement dermatosis, pale hair and skin, oedema, mild neurological signs together with cheilosis, kerato-folliculitis of skin and a macrocytic anaemia. There was but an incomplete response to nicotinic acid, neo-hepatex, iron, marmite and full diet.

H. S. Stannus.

FISCHER (Arthur). Darmtuberkulose als Ursache von Pellagra. [**Intestinal Tuberculosis as a Cause of Pellagra.**]—*Deut. Tuberkulose-Blatt.* 1942. Feb. Vol. 16. No. 2. pp. 25–31.

The causes of pellagra are reviewed with especial reference to those resulting in deficient absorption from the alimentary canal.

Two cases of tuberculosis involving the intestines are then described in which the manifestations of pellagra appeared. The patients, who were both young men, were treated with "Nicobion" a nicotinic acid

preparation, with resulting amelioration of the pellagra. One of the patients, whose tuberculosis was advanced, eventually died, but the general condition of the other was considered to be influenced favourably after remission of the pellagroid symptoms.

The cause of the pellagra in these cases is discussed, and is attributed to the disturbance in absorption from the gut brought about by the tuberculous lesions.

[See also HURST, below (Sprue).] *L. J. Davis.*

SPRUE.

HARRIS (Seale) & HARRIS (Seale), Jr. **The Genesis of Pellagra, Pernicious Anemia and Sprue.**—*Amer. Jl. Digestive Dis.* 1942. Jan. Vol. 9. No. 1. pp. 29–35.

Basing their views mainly on clinical data these authors believe that pernicious anaemia, pellagra and sprue are not in any way to be regarded as different manifestations of the same disease, but as three separate and distinct diseases.

There are symptoms which may be common to all three, including gastro-intestinal and nervous manifestations and macrocytic anaemia, so that it may well be that in an adult with achlorhydria, diarrhoea, mental depression and motor manifestations due to involvement of the lateral and posterior columns of the cord with severe anaemia, but without skin lesions, it may be impossible to make a positive diagnosis either of pellagra, pernicious anaemia or of sprue.

The arguments are supported by illustrative cases, seen in family practice, as well as culled from the literature. It is concluded that pellagra, pernicious anaemia, and sprue are allied nutritional diseases. Importance is attached to atrophic changes in the liver which are common to all three diseases, and this essential pathology is adduced as evidence of their similarity.

The somewhat puzzling outlook on this complicated problem can be illustrated by an account of combined pernicious anaemia and sprue in the same patient, in which dramatic improvement followed the use of canned liver. The author's views are open to criticism in that there is nothing to indicate that the anaemia was anything more than macrocytic anaemia, which is the inevitable part and parcel of sprue.

[The style of the article is confusing and many statements are obscure and contradictory. Much of it has been lifted bodily from the recent book on Pellagra (1941) by the same authors, and although the paper is written by father and son in conjunction, yet many of the statements are made in the singular.] *P. Manson-Bahr.*

HURST (Arthur). **Sprue Syndrome from Obstruction of the Lacteals by Chronic Tuberculosis of the Mesenteric Lymph Nodes.**—*Guy's Hosp. Rep.* 1942. Vol. 91. (Vol. 21, 4th Ser.). No. 1. pp. 25–34. With 3 figs. [18 refs.]

See also FISCHER above (Pellagra).

RODRIGUEZ MOLINA (Rafael). **Sprue in Puerto Rico. A Clinical Study of 100 Cases.**—*Puerto Rico Jl. Public Health & Trop. Med.* 1941. Dec. Vol. 17. No. 2. pp. 134–151. With 2 figs. [Refs. in footnotes.] [Spanish version pp. 152–168.]

A clinical study of 100 cases—57 males and 43 females from 12 to 78 years of age, the mean being 40·14. The series comprised 87 white, 13 coloured, of whom two were full-blooded negroes; 98 were natives of Porto Rico. Only uncomplicated cases were selected, but 16 per cent. harboured intestinal parasites—hookworm, Strongyloides, Ascaris, whipworm or amoebic cysts.

Dyspepsia, abdominal distension and epigastric distress were prominent in 97 per cent. In 90 per cent. there were weakness, diarrhoea, emaciation, soreness of tongue and mouth, and anorexia. Intolerance of food declared itself after ingestion of rice and beans.

Some aberrant features are recorded; tenesmus in 35 per cent., blood and mucus in the stools of 20 per cent., tarry stools or fresh blood in some. Nerve disturbances, numbness and paraesthesias occurred in 14 per cent. Anaemia of several types was encountered. The haemoglobin values ranged from 26 to 100 per cent. A normocyte blood picture was present in 7 per cent., microcytic in 1, and hypochromic in 2 per cent. Macrocytosis is an early manifestation. No ulceration of lips or margins of the mouth (cheilosis) was observed. Free hydrochloric acid was present in the gastric juice in 82 cases. Occasionally there were changes in the skin resembling pellagra, but no erythemas or ulcerations.

Oedema was present in 40 per cent., most frequently in feet and ankles. Pyrexia was another feature, recorded in 37 per cent. Rather exceptional was the absence of shrinkage of the liver, which was present in 10 per cent. only. Moreover, the copious foul stools as usually described were not seen, but the colour was usually golden or brown. It is considered that low value for blood calcium between 8·5 and 9 mgm. may be of little significance in a country where the normal daily intake is so low.

By a combination of gastroscopy and sigmoidoscopy it is possible to state that changes are seen corresponding to those of acute glossitis and stomatitis.

It is concluded that the sprue syndrome is a deficiency state and that the anaemia is caused by gastro-intestinal dysfunction combined with failure of adequate absorption of nutritional substances essential to erythropoiesis.

Gastrointestinal symptomatology and changes in skin and mucosa are associated with a deficiency in vitamins A and B.

P. Manson-Bahr.

OETTEL (H.) & THADDEA (S.). **Significance of Hypoproteinemia in Nontropical Sprue.**—*Deut. Arch. f. Klin. Med.* 1941. May. Vol. 187. p. 353. [Summary taken from *Jl. Amer. Med. Assoc.* 1942. Feb. 21. Vol. 118. No. 8. p. 675.]

Oettel and Thaddea investigated the problem of protein balance in nontropical sprue. They maintain that reduction of the plasma protein with edema may exist years before the appearance of intestinal disorders; for this reason it is doubtful whether the primary disturbance of sprue is always to be found in the intestine. In only one patient did

the protein deficiency of the plasma run parallel to the gastrointestinal symptoms. In two others protein deficiency of the plasma existed years before sprue symptoms appeared. The combination of adrenal cortex extract and liver preparations is particularly effective in the treatment. Extracts of the anterior pituitary are ineffective. Since results could be obtained with transfusions and with adrenal cortex preparations it can be assumed that the protein formation in the liver and bone marrow is impaired. Disturbances in protein formation as well as in absorption play a part in the pathogenesis of nontropical sprue. The disturbance in the plasma protein formation may be the clinico-chemically detectable onset: the vicious circle which follows results in secondary disturbances in the intestinal absorption. The functional impairment of the adrenal cortex, which is likewise secondary, explains such clinical signs as absorption disturbances in pigments, plasma proteins and fats. Nontropical sprue predisposes to hypovitaminosis A. Metabolism, salt and mineral metabolism become secondarily impaired. Relation to incretory [endocrine] glands can be explained by the close relationship between hormones and vitamins. There is so far no proof for the causative rôle of the hypophysis and the adrenal glands in nontropical sprue. The theory that the disturbance in intestinal absorption is caused by hypoproteinemia and that it develops parallel with other manifestations of failing function (edema, hypocalcemia, nephrosis) is supported by the authors' observations.

HAEMATOLOGY.

DAMESHEK (William). **Hematology: Anemia, with Particular Reference to the Hemolytic Syndrome.**—*New England Jl. of Med.* 1942. Feb. 26. Vol. 226. No. 9. pp. 339–346. [66 refs.]

This is a review of recent work which deals with hypochromic microcytic and hyperchromic macrocytic anaemia and with the haemolytic syndromes. Of special interest to readers of this *Bulletin* are the haemoglobinurias, favism, and sickle-cell anaemia, which are dealt with briefly. *C. W.*

KLINEFELTER (Harry F.). **The Heart in Sickle Cell Anemia.**—*Amer. Jl. Med. Sci.* 1942. Jan. Vol. 203. No. 1. pp. 34–51. With 6 figs. [29 refs.]

Cases of sickle cell anaemia show diffuse enlargement of the heart and commonly systolic and diastolic murmurs. There is a third heart sound at the apex with an accentuation of the second pulmonary sound, and a systolic murmur at the base. The P-R interval is often prolonged. In comparing the similarities between rheumatic fever and this disease it is noted that in sickle cell anaemia the pain is not confined to the joints, and there is little response to salicylates. The diagnosis of rheumatic heart disease has not been confirmed at autopsy in case of sickle cell anaemia. Congestive heart failure not responsive to digitalis is common only in the terminal stages. It is probable that the cardiac changes are due to the prolonged severe anaemia with its consequent anoxaemia.

The pathological state of the heart is more marked than in other anaemias as this type is of longer duration than the other severe anaemias. The prolonged A-V conduction time is explained as due to increased vagal tone, again secondary to the anoxaemia. Even though the clinical picture resembles rheumatic fever, there is no proved instance of the two diseases occurring together; there appears to be no reason to regard patients with sickle cell anaemia as specially liable to rheumatic fever. *W. P. Kennedy.*

VENOMS AND ANTIVENENES.

TAYLOR (Elizabeth). **Snake Bite and Pituitrin.** [Correspondence.]—*Med. Jl. Australia.* 1942. Feb. 28. 29th Year. Vol. 1. No. 9. p. 271.

The author reports three cases of bite by the death adder [presumably *Acanthophis antarcticus*, see this *Bulletin*, 1939, Vol. 36, p. 568]. This snake is common in the Northern Territory of Australia, and its bite is regarded by the natives as invariably fatal. During one month she treated the three cases by giving pituitrin (1·0 cc. for an adult) as soon as possible, and repeating the dose in 2–4 hours. At the same time the usual snake-bite treatment [not detailed] was given and the patients were wrapped in blankets, with hot-water bags, and given hot milk and brandy until the condition improved. After 3–4 hours there was no distress in breathing and the pulse improved; after a few days all the patients recovered. [The action of the venom of *A. antarcticus* is largely neurotoxic.] *C. W.*

CLARK (Herbert C.). **Venomous Snakes. Some Central American Records. Incidence of Snake-Bite Accidents.**—*Amer. Jl. Trop. Med.* 1942. Jan. Vol. 22. No. 1. pp. 37–49. [12 refs.]

The author reports on the identification of over 3,000 snakes from Tela, Honduras; the identification was carried out at Harvard University. The commonest poisonous snakes were *Bothrops atrox* (*fer de lance*), *B. lansbergii* and *B. nasutus* (hog-nosed vipers), *B. schlegelii* (horned palm viper), *B. lateralis* and *B. nigroviridis nigroviridis* (both tree snakes), *B. godmani*, *B. nummifera* (jumping snake), *Lachesis muta* (bushmaster), It is noted that *Crotalus terrificus*, though found in Panama, Costa Rica and Colombia, was not found in this survey; it prefers dry tableland or desert regions. Of the Elapidae, several species of Micrurus are recorded, but they are not of great importance.

It is pointed out that snake bite is not common, in spite of the number of poisonous snakes, and that serious cases resulting in death are rare. In three years there were 104 cases with 7 deaths. Most of the bites were on the hands or legs below the knee. The venomous snakes are usually nocturnal in habit, and are able easily to capture rodents. It takes about two weeks for the glands to regain their maximum capacity of venom after complete discharge, and it is probable that, as the glands are well emptied in striking a small animal, and are probably frequently emptied because rodents are plentiful, bites in man may often be made with only partial discharge of venom. Young snakes may not be able to swallow rodents and may be active in the daytime and therefore dangerous to man.

In treatment it is pointed out that the essential measures, to be effective, should be taken immediately after the bite, and that the elaborate procedures which have from time to time been advocated may not be applicable. The first step should be to kill the snake for identification. A tourniquet to stop venous but not arterial flow is advocated ; it should be released for a few seconds every 10 minutes, and extraction of the venom by suction should be started at once. Suction may be applied by the mouth over a thin sheet of rubber laid over the bite. This should be continued vigorously for five minutes, and the site should then be washed and suction repeated. Incisions at the site are not advised, as they may merely hasten absorption. Antivenene should be given subcutaneously, and the tourniquet should be kept in position for an hour after the administration of antivenene. Alcohol is contraindicated, and permanganate cannot reach the droplets of venom beneath the skin.

In Central America 80 to 85 per cent. of bites are due to species of Bothrops, and anti-bothropic serum can be used with a good chance of effectiveness in all cases. *C. W.*

ARANTES (J. B.) & NEIVA (Cicero). VII. Toxicidade do veneno de "Micrurus frontalis" para o cobaio : a. Via subcutanea. [**Toxicity of the Venom of** *M. frontalis* **for the Guineapig.**]—*Brasil-Medico.* 1942. Feb. 28. Vol. 56. No. 9. pp. 97–98. English summary (5 lines).

"Experiments were conducted by subcutaneous injections into guinea pigs weighing 330–380 gm. in order to investigate the action of the Micrurus frontalis venom. The minimum lethal dose was ascertained as 0·3 mg."

ARANTES (J. B.) & NEIVA (Cicero). VIII. Toxicidade do veneno de "M. frontalis" para o cobaio : b. Via intramuscular. [**Toxicity of the Venom of** *M. frontalis* **for the Guineapig.**]—*Brasil-Medico.* 1942. Feb. 28. Vol. 56. No. 9. p. 98. English summary (4 lines).

"The minimum lethal dose of the *Micrurus frontalis* venom was ascertained by intramuscular injections, as 0·25 mg. in experiments on guinea pigs weighing 330–380 gm."

GAJARDO TOBAR (R.). **Bite of Wheat Spider** (*Latrodectus mactans*).—*Rev. Méd. de Chile.* 1941. Nov. Vol. 69. p. 707. [Summary taken from *Jl. Amer. Med. Assoc.* 1942. Apr. 4. Vol. 118. No. 14. p. 1259.]

Gajardo Tobar describes observations in 23 cases of bite by the black widow spider, Latrodectus mactans, a species found throughout Western America from California to Patagonia. The spiders are most numerous during the dry months. Harvesters, stookers and threshers are most exposed. The bite produces a sensation of lancing, and if the cause is searched for the spider may be found in the clothing. The venom of Latrodectus mactans is neurotropic. The bite is followed by a ten minute latent period, after which the local pain recurs and rapidly increases to involve the entire body. Clonic contractions, tremors, spasmodic movements and convulsions follow. The symptoms and pains are intermittent and reach their maximum intensity in the

waist, arms and legs. The muscular contractions and the excruciating pain bring about rigidity of the abdomen and of the chest. The patient experiences precordial and abdominal oppression and has the feeling of approaching death. There may be disorientation, hallucinations, delirium, debilitating sweats, profuse salivation and lacrimation. The sensitivity of the skin and the reflexes are exaggerated. The respirations are rapid and shallow. Temporary tachycardia is followed by bradycardia. The arterial pressure increases and later falls. Albuminuria and uremia develop. Intestinal and vesical paralysis develop, and the urinary secretion is diminished. There may be priapism, ejaculations and enuresis. After a few hours the symptoms abate somewhat, only to return in paroxysms. The disorder persists for a week. The convalescence is characterized by physical and mental fatigue. The literature reports fatal cases, but as a rule the patients recover. The bite confers a temporary immunity. In animals the immunization persists for about three months. Persons have been bitten by Latrodectus mactans several times and each time have had all the symptoms of poisoning. The treatment is chiefly symptomatic. Hot baths, morphine and atropine sulfate are employed to counteract pain, convulsions and spasms. Sparteine and camphor liniment are administered as cardiac stimulants. Physiologic solution of sodium chloride, dextrose solution and thiamine hydrochloride are given to counteract the intoxication. It would be most desirable to obtain a specific serum as recommended by Vellard and as prepared by Troise in Argentina. The difficulty in producing a specific serum is the insufficient quantity of venom available.

GAJARDO TOBAR (Roberto). Las arañas y su veneno. [**Spiders and their Poison.**]—*Medicina Moderna.* Valparaiso. 1941. Nov. Vol. 15. No. 4. pp. 147–151. With 3 figs.

A discursive paper with general remarks on the Black Widow spider (*Latrodectus mactans*) and tarantulas. No illustrative cases are recorded. There is a good illustration of the former. *H. H. S.*

DERMATOLOGY AND FUNGOUS DISEASES.

AGUIRRE PEQUEÑO (Eduardo). Un documento de gran valor, casi ignorado, en la historia del mal del Pinto. Comentario a las investigaciones practicadas por el Dr. Guillermo Téllez, durante los años 1880–1889. [**A Little-known Document on Mal del Pinto.**]—*Medicina.* Mexico. 1942. Jan. 25. Vol. 22. No. 404. pp. 13–25. [16 refs.]

In view of the recent ideas that Mal del Pinto is a form of or closely allied to syphilis, the following is of considerable interest. Dr. Guillermo Téllez attended a Congress of the Academy of Medicine in 1879 at which he heard a good deal of discussion on Pinta or Mal del Pinto. He was not convinced on several points and moved to Iguala, in the province of Guerrero, to devote himself to a study of it. After eight years of intensive investigation he published a monograph in 1889, a work in 44 pages, the first chapter of which treats of its definition, synonymy and history, and he designates the disease as " a venereal, apyretic, contagious and congenital affection," and later " a kind of

syphilis." Elsewhere he makes the following observations: Pinta is a septic poisoning of syphilitic nature; its cutaneous manifestations simulate syphilitic exanthemata; the different colours are not due to variety of cause, but depend on the individual [and the site] affected; its treatment is that indicated for syphilis. *H. H. S.*

ESCOBAR (José J.). Contribución al estudio de la "Enfermedad Azul de los Chillos." [**Blue Disease of the Chillos Indians.**]—*Med. y Cirugia.* Bogota. 1940. July. Vol. 4. No. 11. pp. 436–440, 442–445, 447–448.

The condition described with a wealth of detail in this article occurs among the inhabitants of the Chillos Valley, in the Andes, separated from Quito by the Puengasi hills on the west, with the Ilaló hills to the north, the slopes of Pasochoa to the south and those of Antisana on the east. The inhabitants among whom the condition occurs are poor, very dirty, and infested with head and body lice; scabies and intestinal parasitosis are common.

The author defines the "blue disease" as a chronic dermatosis, not hereditary, characterized by dark deposits in the skin producing zones of bluish pigmentation alternating with hypochromic zones, not pruriginous, in more advanced areas exfoliation, and with ulcers of the mucosa. Later, he states that the labial and buccal mucosa also shows the blue patches. Cases are seen in children of three years and in persons of either sex and at all ages above this. Natives and half-castes are chiefly attacked, but it is seen also in those of white race. It is, as stated in the definition, not hereditary and is not contagious. The coloration is a dark blue (like mercurialism, but "rather darker") and the larger areas arise from confluence of those smaller. It is commonest on the exposed parts—face, neck, arms, hands, legs and feet—but may affect the trunk. There is no alteration of sensation, tactile, thermic and the sense of pain are unaffected. Loss of the eyelashes is common, but not alopecia of the scalp or body. Palms and soles are not affected; there is widespread glandular enlargement, especially in the groin and axilla.

The author finds spirochaetes in the "skin lymph" (liquido intersticial (linfa) de la piel), after "washing with alcohol and rubbing with cotton wool moistened with saline." These are from 7 to 20μ long and 0·20–0·25μ broad, with eight to 16 turns, average 13, not regular like those of *Sp. pallida.* Wassermann, Kolmer and Kahn reactions are always positive. Treatment with 0·3–0·45 gm. neosalvarsan is followed by disappearance of the spirochaetes from the skin in 24 hours, but does not modify the pigmentation.

The author regards the condition as a spirochaetosis, a general and not merely a local condition, because of the adenopathy, the serological reactions and the widespread involvement of skin and the mucosal symptoms. He describes briefly the histology of the skin affected: atrophy of epithelium, thickening of the stratum corneum, wasting of papillae, diminution (escasez) of glands, vessels and follicles, collagen fibrils abundant and the presence of spirochaetes visible by silver impregnation methods.

The differential diagnosis is made from:—

1. Vitiligo, because the sites affected differ; vitiligo does not invade the mucosa, nor is the W.R. positive.

2. Leprosy; no modification of sensation, no affection of nerve trunks, no infiltration, and absence of Hansen's bacillus in blue disease.

3. Syphilis. No primary chancre, not a variety of skin lesions, no tertiary signs, does not produce abortion, and "blue disease" subjects may acquire syphilis.

4. Caraate (pinta). Not varying colours, edges not sharply defined, mucosa affected, spirochaeta said to be thinner, longer, less motile and more difficult to stain than that of pinta.

[The author does not mention the "blue disease" known as vagabond's disease due to pediculosis; this will not, of course, explain the mucosa involvement, but this is not mentioned in the definition of the disease and the subjects were dirty and verminous. Nor does it explain the presence of the spirochaetes on the skin.] *H. H. S.*

PEÑA CHAVARRÍA (A.) & OVARES (Julio C.). Un caso de blastomicosis cutánea producida por *Torulopsis mitis*. [**Cutaneous Blastomycosis due to** *Torulopsis mitis*.]—*Rev. Medica.* San José. 1941. May. Year 7. Vol. 4. No. 85. pp. 475–480. With 4 figs.

The patient was a white girl, 17 years of age, with various parts of her body showing ulcers of a rupial character (but there were no other signs of syphilis and the W.R. was negative). She stated that two months before, when she was in excellent health, she was bathing in a rivulet and felt a "prick of a fly" on the left side of her face. In 24 hours vesicles appeared on legs and arms which suppurated and discharged a thick yellow pus. Crusts formed, rugose, thick, but not very adherent. Examination revealed a yeast-like body which a mycologist cultivated and identified as *Torulopsis mitis*.

This was isolated by MAZZA and his colleagues in an Argentine in 1930. The fungus will not grow at 37°C., but in three days at "ordinary" temperature produces colonies slightly raised in the centre, of a salmon-pink colour, and with irregular borders. Treatment with large doses of iodides, 1 gm. of KI and 2 gm. of NaI daily, led to marked amelioration in four days and the ulcers were beginning to cicatrize; crusts came away in 10 days, leaving pigmented scars, some of them keloid. The multiplicity of the lesions on the white skin produced a condition in which the patient was "spotted like a leopard" (la piel manchada del leopardo). *H. H. S.*

MOTTA (Orlando Cabral). Micetoma toracico actinomicosico. (Contribuição ao seu estudo clinico.) [**Actinomycosis of the Thorax.**]—*Brasil-Medico.* 1942. Feb. 28. Vol. 56. No. 9. pp. 99–102. With 4 figs. English summary.

The patient was a child under nine years of age complaining of pain (stitch) in the right hypochondrium with fever, 39·9°C., cough, greenish-coloured sputum and shortness of breath. Pleurisy was diagnosed; a puncture drew off only clear fluid. Soon after the temperature rose a little higher and a fresh puncture was made and purulent fluid withdrawn. A swelling "the size of a mango" appeared in the right side of the chest and fistulous openings discharging fetid pus. In the pus and the sputum actinomycotic granules were seen. Treatment was with potassium iodide, starting with one gramme daily and gradually increasing the dose till 4 gm. daily were taken, usually five days in succession, then two days' rest. During 12 months she took altogether 180 gm. of the iodide and 25·5 gm. of Dagenan. Cure resulted.

H. H. S.

DERRY (D. C. L.), CARD (W. I.) & WILSON (Richard). **Histoplasmosis of Darling. Report of a Case. With Mycological Note** by J. T. DUNCAN.—*Lancet.* 1942. Feb. 21. pp. 224–227. With 6 figs. on plate.

The case described is that of a soldier who was invalided from France in 1940 because of a persistent cough and fever thought to be due to tuberculosis. Long search failed to reveal tubercle bacilli and finally intracellular yeasts were observed in discharges from a broken-down swelling in the neck and an enlarged inguinal gland. In spite of treatment of an empirical nature the patient deteriorated and died. Post mortem examination revealed a large breaking-down mass behind the liver, while in the organs occurred necrotic areas surrounded by cells containing yeasts. Cultures of the yeast yielded mycelial growth. The organism was identified as *Histoplasma capsulatum.* This is the first case of histoplasmosis to be recorded in England, but in view of the increasing number of cases reported from North and Central America it seems probable that the disease may have been overlooked in this country. *C. M. Wenyon.*

HENDERSON (Richard G.), PINKERTON (Henry) & MOORE (Louis T.). **Histoplasma Capsulatum as a Cause of Chronic Ulcerative Enteritis.** —*Jl. Amer. Med. Assoc.* 1942. Mar. 14. Vol. 118. No. 11. pp. 885–889. With 4 figs. [Refs. in footnotes.]

The case recorded is that of a man 70 years of age who was admitted to hospital with persistent diarrhoea which proved fatal three days later. Post mortem examination showed the case to be one of histoplasmosis, the pathological feature of which was an ulcerative enteritis. A review of the literature has shown that 8 of 25 thoroughly studied cases had a similar pathological condition of the bowel, but that in only two of these was there a history of severe prolonged diarrhoea. There existed in the case described tubercle-like lesions from which parasites appeared to be absent. The involvement of the mesenteric lymph nodes suggests that the gastro-intestinal tract was the portal of entry of the parasites.

In a second case, briefly noted, diagnosis was established by the discovery of parasites in a lesion on the tongue clinically suggestive of carcinoma. *C. M. Wenyon.*

VILLELA (E.) & PARA (Madureira). **Histoplasmosis in Child: Case.**—*Rev. Brasileira de Biologia.* Rio de Janeiro. 1941. Dec. Vol. 1. p. 449. [Summary taken from *Jl. Amer. Med. Assoc.* 1942. Apr. 4. Vol. 118. No. 14. p. 1259.]

The case reported by Villela and Madureira Para is the thirteenth in the medical literature, the fifth of the disease in a child and the first in Brazil. The disease is probably more frequent than is believed. It may be mistaken for visceral leishmaniasis, particularly in regions where that disease is endemic. The disease is fatal. The authors' patient, a boy aged 3 years, lived in unhygienic conditions among dogs and cats. He presented fever and progressive debility for one month. Later there developed diarrhoea with blood in the feces and progressive emaciation. The treatment consisted in administering polyvalent antidysenteric vaccines and vitamins A and D. Jaundice

and red spots over the body appeared one week before death. The diagnosis was made from the microscopic study of the liver, which was enlarged, waxy in color and friable. The microscopic appearance was typical of histoplasmosis. The parenchyma of the liver presented enormous proliferation of reticuloendothelial cells, which were engorged with Histoplasma capsulatum. The monocytic cells were also increased and contained histoplasma. Identification of H. capsulatum and its differentiation from leishmania in human tissues is best accomplished by the use of Heidenhain's iron hematoxylin stain, the Giemsa, Gram and Goodpasture stains and the double impregnation method of Del Rio-Hortega. The rarity of histoplasmosis in Brazil may be seen from the fact that, of 186,000 cases in which liver specimens were examined microscopically in the laboratory of the Yellow Fever Service, in only one has this blastomycosis been found, while in 131 cases in the same series visceral leishmaniasis was discovered.

MISCELLANEOUS.

WEST (E. M. B.). **Tropical Natives.** *South African Med. Jl.* 1942. Feb. 28. Vol. 16. No. 4. pp. 86–89. With 2 charts.

Until recently there was a rule which forbade the entry of natives from north of the line Lat. 22°S. into the Union of South Africa for work, but this rule has probably been relaxed. It is feared that depletion of the adult male populations of undeveloped territories may lead to insufficient able bodied adults to prepare new land, and to consequent malnutrition and disease and lowered birth rate, so that eventually the labour reserve will disappear. In recent years the Government of Southern Rhodesia has been concerned at the amount and physical state of labourers entering for work, and an investigation has been made at the important point of entry at Victoria Falls. During 1940, 3,642 boys from Northern Rhodesia and 2,128 from Angola (Portuguese West Africa) were examined clinically, and the average weight for height was charted. At 5 ft. 1 in. the average weight was 10 lb. below the European average ; at 5 ft. 11 in. for Northern Rhodesian immigrants it was nearly 30 lb., and for Portuguese West African immigrants nearly 40 lb. below European average. Of these immigrants 1,042 were detained as unfit to proceed, and were given a standard diet of 2 lb. mealie meal each day, 2 lb. meat and vegetables each week, with an issue of ground nuts and salt. They were also treated for malaria, hookworm and anaemia as necessary. After one week they showed an average increase of 3 lb. at 5 ft., and of 4 lb. at 5 ft. 11 in. The average weights of boys who had been employed at the mines in Northern Rhodesia for at least 6 months were 20 lb. at 5 ft., and 25 lb. at 5 ft. 11 in. higher than those of the immigrants who had been detained.

In some cases there is no increase in weight after detention, and this is often due to malaria, hookworm infection, schistosomiasis or chest complaints. These immigrants carry to their new surroundings the diseases of the old, and though perhaps themselves immune to severe attacks of malaria, provide reservoirs of infection. The fact that in Southern Rhodesia and Matabeleland an increasing number of streams

are becoming infected with schistosomes provides justification for the assumption that these natives are introducing the disease. Further, it is known that disease is spread particularly in conditions of overcrowding and it is to the slum quarters of towns that these natives may finally gravitate.

Improvement may be effected by improvement of housing in native quarters of towns and by the control of immigrants to prevent the introduction of disease. Further investigations will probably confirm these findings. *C. W.*

SOTOLONGO (Federico) & GOLDBERGER (Jacques). **Endoscopic Examinations in Cases of Parasitism and Tropical Diseases.**—*Rev. Med. Trop. y Parasit.* Habana. 1941. Nov.–Dec. Vol. 7. No. 6. pp. 110–119. [22 refs.]

Anal swabs were made with Hall's N.I.H. apparatus, the cellophane moistened with 1 per cent. sodium chloride. For the study of the minute structure of the intestinal mucosa a special proctosigmoidioscope was employed, equipped with an optical and irrigating system—the Deplic-optic proctosigmoidoscope (Goldberger). Vaseline and other lubricants were not employed as they are liable to obscure the microscopic picture, but mucilage and glycerine were used as substitutes.

In cases examined with the optical instrument under water irrigation, the "wash water" was collected, sedimented and microscopically examined.

Of 108 cases investigated, 19 had *Oxyuris vermicularis*, 14 *Trichuris trichiura*, 6 Taenia, 4 Ascaris, 3 *Hymenolepis nana*, 15 amoebiasis, 2 *Balantidium coli*, and 3 sprue.

By the anal swab method with N.I.H. swabs the presence of ova in the anal canal and perianal ridges can be demonstrated in Oxyuris, Trichuris, *T. saginata*, *Hymenolepis nana*, and *Ascaris lumbricoides* infections.

It was surprising to find the proctoscopic picture of Oxyuris to consist of haemorrhages and hyperaemia. The parasite itself may be detected in the region of the internal sphincter. In Trichuris infection, various forms of chronic procto-sigmoiditis were noted and ova were found in swabs from the lesions.

In amoebiasis minute ulcers were characteristic, the larger flask-shaped, ovoid, octagonal or star-shaped, the edges being undermined. Zones of elevated hemispherical or ovoid patches are termed, perhaps appropriately, "frog-egg" zones. These seem to be covered by a transparent wrapping, concealing a mass of yellow-green necrosis. The conversion of these into ulcers can be observed to take place, but they may persist unaltered for 10 weeks or longer.

"Red pits" appear as red poppy-seed spots scattered on the mucosal surface. They are minute cicatrizations surrounded by small haemorrhages.

The parasite cannot be found in the "frog-egg" zones, unless they are ruptured by a biopsy forceps, but when ulcerated, *E. histolytica* can be seen in scrapings and swabs. When this fails, administration of cathartics succeeds and cysts can be found in decanted wash water.

In balantidiasis, epithelial lesions of different sizes and shapes are scattered over an intact mucosa.

In sprue, the procto-sigmoidoscopic picture, in acute cases, is characterized by reddish-pink granular mucosa.

In chronic cases large sections of the gut bear appearances similar to smoked and boiled bacon ; there are superficial erosions, and large excoriations, or even small granulations resembling greyish-brown poppy seeds. It is claimed that these lesions distinguish sprue from other forms of steatorrhoea. *P. Manson-Bahr.*

HERNANDO ORDOÑEZ (J.). Sobre el tratamiento de las ulceras crónicas. [**The Treatment of Chronic Ulcers.**]—*Med. y Cirugia.* Bogota. 1941. Mar. Vol. 5. No. 7. pp. 294, 296–300.

Notes, fairly detailed, are given of three cases and brief notes of four others. In one, the ulcer was a sequela of erysipelas, in another of a burn, others of injuries not specified. The usual forms of treatment, such as disinfectants, rest in plaster, zinc oxide, lanoline and so forth, were tried in vain, or, if some degree of healing occurred, breaking down followed soon after. The author's method is to rest the limb and apply precipitated yellow oxide of mercury in a strength of 1 per cent. in lanolin and vaseline. In the cases mentioned, healing took place in 2–3 months and seemed to be permanent. Its use in specific ulceration, *e.g.*, leishmanial, tuberculous, sporotrichosis, is yet to be tested. *H. H. S.*

LEWIS (R. R.). **A Rapid and Certain Cure for Miliaria Rubra.**—*Jl. Roy. Army Med. Corps.* 1942. Feb. Vol. 78. No. 2. pp. 86–89.

In this refreshing article the author makes short work of many of the views which have been advanced to determine the cause of prickly heat, and states his own opinion [surely correct] that the two principal factors are a hot humid climate and, in the unfortunate patient, a strong tendency to sweat. The wearing of excessive clothing is also a factor, especially in infants, but septic foci, over-eating and over-drinking are of little importance. He discusses the clinical signs and the histology of the skin.

In treatment he abandons the advice so commonly given concerning purgation and diet ; he insists that clothing must be light, and gives a prescription for a dusting powder with which he has had great success :

Zinc oxide Boric acid Starch Sulphur sub.	equal parts

This is to be dusted over the parts after sponging and drying, and must be frequently repeated. It is especially valuable for infants, and the author has not seen any case which did not immediately respond. The sulphur is an essential ingredient ; without it the others are useless. *C. W.*

KUILMAN (J.). Een rhinoscleroomgeval in West-Java. [**A Case of Rhinoscleroma in West Java.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1941. Dec. 30. Vol. 81. No. 52. pp. 2785–2789. English summary (7 lines).

" Report of a first case of Rhinoscleroma in West Java (confirmed by bacteriological and histological examination) in a 49 years old male nurse, a native of Menado (Isle of Celebes). The pathological tissue

only occurred endonasally, and presumably existed 23 years already. The therapy consisted of operative removal of the 'tumor' tissue, followed by X-ray treatment, with particular precautions against postoperative shrivelling of the lumen nasi by means of rubber tubes." [See also this *Bulletin*, 1940, Vol. 37, p. 383 ; 1942, Vol. 39, p. 199.]

BEACH (M. W.) & RAVENEL (B. O.). **Tick Paralysis in South Carolina.**—*South Carolina Med. Ass. Jl.* 1941. Dec. Vol. 37. p. 323. [Summary taken from *Jl. Amer. Med. Assoc.* 1942. Mar. 21. Vol. 118. No. 12. p. 1014.]

Beach and Ravenel report an instance of tick paralysis caused by Dermacentor variabilis. A child of four became sick the morning prior to admission to the hospital and had weakness, general malaise, difficulty in arising and a staggering gait. These complaints ceased after an hour, and the child played the rest of the day. On the morning of admission the patient had headache and weakness of the lower extremities on walking. The child was hospitalized. Her condition remained about the same until the second day. While combing the patient's hair a nurse discovered a partially engorged tick. The tick was identified as a female Dermacentor variabilis. Further search did not reveal more ticks. The child's symptoms cleared rapidly, and on discharge twelve days later there was no muscular weakness and only a slight ataxia. The patient was seen two weeks later, and she appeared completely recovered.

ROBERTSON (R. Cecil). **Thyroid Deficiency. The Problem of Endemic Goiter in Yunnan Province.**—*Jl. Clinical Endocrinology.* 1941. Apr. Vol. 1. No. 4. pp. 285–292. With 8 figs.

This is a most interesting article and is so full of facts that abstraction is difficult. Endemic goitre in Yunnan is important enough to warrant the formation of an Anti-goitre Association, with high officials as members and the Governor of the Province as president. Its functions are : (1) To plan and promote anti-goitre measures ; (2) To arrange systematic and periodic surveys ; (3) To consider reports of anti-goitre work ; (4) To maintain a liaison with similar work elsewhere.

Yunnan plateau is above 2,000 metres altitude and in some districts the goitre incidence is as high as 80 per cent., but the distribution is somewhat patchy ; in some villages almost every one of the inhabitants has a goitre. McCarrison noted its prevalence on the Himalayan slopes in regions between 1,500 and 2,000 metres. Also Yunnan water is exceptionally hard (*cf.* Derbyshire throat in the hard water regions of England). People coming to Yunnan from non-goitrous districts develop the thyroid enlargement in six months. All along the valley of the Mekong river the incidence is heavy, west of Paoshan it is less. Endemicity is greatest in secluded valleys in the Shan States. The author is of opinion that geological formation plays a large part. The grass lands are on a porous limestone soil and soluble substances are rapidly carried away. It is in the upper country where sheep, goats, horses and cattle are reared, that goitre is evident ; the lower parts are relatively free. Here rice, potatoes, vegetables and fruits, and some wheat are grown.

Chief among the anti-goitre measures prepared by the Association is the addition of potassium iodide, 5 mgm. to each kilogramme of domestic salt. The difficulty is to obtain an even distribution of the iodide in

large salt cake masses, for it is a measure which must be so simple as to be easily carried out by unskilled workmen. One method is to spray iodide solution into large pans during evaporation, with constant stirring. In some of the Yunnan salt works the salt is issued in small cylinders weighing about 2 kgm. For these the dried crystalline salt may be sprayed with iodide solution before the product is compressed into cylinders.

Another measure suggested is the importation of edible seaweed. It has been found that the iodine in seaweeds is 100 times as active as potassium iodide, and the Laminarias contain more than 0·24 per cent. (the daily need of an individual being between 0·014 and 0·04 mgm.).

Again, all school-children and university students are, or are to be, supplied with a fortnightly dose of 25 mgm. KI in tablet.

For purposes of survey two forms have been drawn up; one for non-medical observers to determine the actual incidence in a district, and the other for medical men to collect information as to hypothyroidism, cretinism, myxoedema, etc., and the relationship to sex, age, water, salt and food. An intensive survey is to be made of seven districts to obtain comparative study of the efficacy of iodization of salt and other preventive measures. It is proposed to examine 70 per cent. of the population, which would mean about 223,000 persons. The article is well illustrated. [See also this *Bulletin*, 1942, Vol. 39, p. 277.]

H. H. S.

GILLETT (J. D.). **A Larvascope for Use in Identification of Living Culicine Larvae.**—*Bull. Entom. Res.* 1942. Apr. Vol. 33. Pt. 1. pp. 27–29. With 1 fig.

Now that it is recognized that yellow fever may be maintained in the jungle by species other than *Aëdes aegypti* the rapid identification of Culicine mosquito larvae in the field may be a matter of some practical importance. In this paper a method is described for the identification of the living larvae. They are first placed in a tube completely filled with water so that they are deprived of oxygen for 15 to 30 minutes. After partial asphyxiation in this way the larvae on return to the air will remain stationary for a long time at the surface and they can then be examined with the microscope. For this purpose a cell is prepared by sealing together four microscope slides, the middle pair being cut on one side so as to form a cell 1·5 cm. square. The most satisfactory width for the cell (in order to ensure that the terminal segments and respiratory siphon are seen in side view) was found to be 2·75 mm. The cell is filled with water, the partially asphyxiated larvae are then introduced and examined with the microscope arranged horizontally.

V. B. Wigglesworth.

MENG (Ching-hua) & WINFIELD (G. F.). **Studies on the Control of Fecal-borne Diseases in North China. XIII. An Approach to the Quantitative Study of the House-frequenting Fly Population. A. The Estimation of Trapping Rates.**—*Peking Nat. Hist. Bull.* Peking. 1941. Vol. 15. Pt. 4. pp. 317–331. With 1 plate. **XIV. B. The Characteristics of an Urban Fly Population.**—*Ibid.* pp. 333–351. With 5 graphs. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Apr. Vol. 30. Pt. 4. pp. 62–64.]

The numbers of flies caught in traps of various kinds have often been used to estimate relative density or the effectiveness of control measures,

but the relation between numbers caught and numbers present has not been determined. In the first paper, this relation is studied for two types of standard traps, the tent trap and the Japanese clock trap. Both are illustrated. The former, which is easy to make and is the more efficient, consists of a rectangular wire cage which the flies enter by way of a tent-shaped screenway approach extending up from a solid wooden bottom and opening into the trap by a long slot. A bait consisting of bread saturated with a mixture of 2 gm. brown sugar, 4 cc. vinegar and 4 cc. water is placed under the centre of the approach so that to reach it the flies have to enter the area under the wooden floor. The other trap has a small wooden box rotated by clockwork and smeared with a solution of sugar in glycerine. The flies alight on the rotating box and are carried past an isinglass guard, which prevents their escape except into a small cage. It was adopted as the standard indoor trap because it is small and objection is not usually made to its presence in a living-room.

Information on the composition of the house-frequenting fly population of Tsinan as measured by trapping was given in a previous paper. The experiments here described, which comprised a preliminary and final series, were carried out in a small, specially constructed house and covered 1,271 trapping hours during the summer and early autumn in 1936 and 1937. Tests were made without extra food and with garbage or bread, sugar and vinegar bait present in the trapping room. A large number of flies was liberated in the room at the beginning of each experiment, and the results are expressed as trapping rates, which show the mean number of flies caught per hour for each 100 flies present. The trapping rates determined in the two series of experiments were significantly different in only 3 out of 12 cases, and in 2 of the 3, the differences were probably caused by improvements introduced in the final series. In view of the fact that the two series were carried out at intervals of a year, and each included daily and seasonal changes for the entire summer, the degree to which the rates coincided is considered remarkable, and it is concluded that the rates show the relation between the mean number caught by a given trap and the number of flies present, and that this relation tends to remain reasonably constant from time to time.

The tent trap had a significantly higher trapping rate for *Musca domestica vicina*, Macq., than did the clock trap under all three conditions as to food supply. The clock trap had a significantly higher rate for *Chrysomyia megacephala*, F., than the tent trap in the presence of either garbage or bait, and a higher rate in the preliminary tests and a slightly lower one in the final tests with no food in the room. The tent-trap rates for *Muscina stabulans*, Fall., the genus *Sarcophaga*, *Lucilia sericata*, Mg., and the group of miscellaneous species were all significantly higher than the clock-trap rates when no food was present, but in the presence of garbage or bait, the rates did not differ significantly except in the case of the miscellaneous flies in the presence of bait, which were more numerous in the tent trap. The rates for *Musca domestica vicina* were significantly reduced for both traps when either garbage or bait was available in the room. The tent-trap rates for the other species, the miscellaneous group excepted, were all significantly reduced by the presence of these foods, but the clock-trap rates were unaffected. The bearing of the habits of the various species on the rates for the different conditions and traps is discussed. The fundamental difference in the behaviour of indoor and

outdoor species suggests that the trapping rates for the latter in the experiments, which were necessarily carried out in an enclosure, may be too low when applied to outdoor stations. Comparative trapping rates for *M. d. vicina* and *C. megacephala* for the two kinds of traps under the three conditions of food supply in both series of experiments are shown in a table. The tent-trap rate for the former was significantly higher than that for the latter under all conditions, probably on account of the reluctance of the outdoor species to enter gloomy areas, but a significant difference was only once obtained in the clock trap; this was in the final series with no food, when more of *M. d. vicina* were taken. Under all the other conditions, the rate for *Chrysomyia* was slightly the higher.

In conclusion, a table is given showing theoretical trapping rates for the various flies in each trap in the presence or absence of food (garbage or bait). These rates are based on the experiments, with greater weight given to the final series. They have been used in calculating the fly density indices that will be given in the following papers of the series.

The technique used and results obtained when the method described above was applied to the study of the fly population of Tsinan in 1936 are recorded in the second paper. Trapping was carried out from June at indoor stations and April at outdoor ones to the end of December. The tent trap was used at outdoor stations and the clock trap at the indoor ones. The numbers of trapping hours, of flies caught and of flies identified at indoor and outdoor stations and at the faeces disposal ground (which is considered separately from the other outdoor stations) and the percentage of the various species are given in a table. *M. d. vicina* formed 52·09 per cent. of the total identified catch and 96·32, 29·12 and 59·30 per cent. of the catches at the indoor and outdoor stations and the disposal ground, respectively. The corresponding figures for *C. megacephala* were 18·31, 2·30, 41·13 and 5·73. Another table shows the general and specific fly density indices, or estimates of the populations present calculated from the trapping rates as described in the first paper and the percentages belonging to each species as calculated from the indices (corrected percentages). The three indoor stations with the highest general density indices all had especially attractive food supplies. The densities in the remaining ones indicated that flies breed more in the villages than in the city. Indices for *M. d. vicina* closely followed the general ones. The general index in the indoor stations was 57·7, and the specific indices for *M. d. vicina* and *C. megacephala* were 54·7 and 2·2, the corrected percentages for these two species being 94·7 and 3·81. The highest general density indices outdoors were at a garbage bin and the disposal ground where specially attractive conditions prevailed. The other stations showed the same trend as the indoor ones. The general index at the outdoor stations, excluding the disposal ground, was 532·6, and the indices for *M. d. vicina* and *C. megacephala* were 68·1 and 363·5, the corrected percentages being 12·8 and 68·2. At the only outdoor station within the city and at the disposal ground, *M. d. vicina* was more numerous than *C. megacephala*. The group comprising species other than these two showed greater densities outdoors than indoors, where it was almost negligible. Detailed comparisons of populations in the different stations and districts are made in a further table, and monthly variations are shown in tables and figures. *M. d. vicina* dominated the indoor fly population throughout the trapping period, and its greatest density occurred in

July. *C. megacephala* was taken in less than half of the outdoor stations in June and July; its numbers rose rapidly in August, were greatest in September and dropped sharply in October and November, when the last individuals were taken. The findings in an indoor control station in which all flies (1,831) were caught and identified are shown in a table. They corroborated conclusions concerning other indoor stations, 91·77 per cent. of the flies being *M. d. vicina.*

CROSS (J. C.). **A Simple Method of controlling Termites.**—*Science.* 1942. April 24. p. 433. [Summary appears also in *Bulletin of Hygiene.*]

Termites cause much damage and even destruction of buildings in the tropics. The author speaks of a method, simple and cheap, which, if effectual elsewhere as well as in Texas, will be indeed a godsend. The aim is to prevent their entrance while the building is under construction [care being taken, of course, not to use any infested wood, however light the infestation]. Wherever the building touches the ground, a small ditch is made and discarded motor oil (or any crude oil) poured in. In an experimental house with 56 concrete piers in the foundation, this was done except in one place which was overlooked. Termites entered there but nowhere else. They were killed with chloroform fumes and the place duly oiled. This was four years ago, and though the soil outside is heavily infested no termites have entered. The oil stays long in the ground and does not spread more than a few inches and so has no deleterious action on adjacent shrubbery.

H. H. S.

SCOTT (R. R.). **The Medical Training of Africans in Tanganyika Territory.**—*South African Med. Jl.* 1942. Feb. 28. Vol. 16. No. 4. pp. 83–86.

SPECIAL RESEARCH SECTION.

LEWIS (E. Aneurin). **Interim Report on Experiments to control *Glossina pallidipes* in the Lambwe Valley, South Kavirondo, Kenya Colony.**—11 mimeographed pp. With 1 map & 6 figs. 1941. Aug. 5. Kabete.

This interim report describes the methods and results obtained in experiments to control the tsetse fly, *Glossina pallidipes*, by trapping and without complete clearing of bush. The Lambwe Valley is about 24 miles long and averages four miles in width. It was formerly well populated, but following an outbreak of sickness among livestock from 1908 onwards, the valley has become almost completely uninhabited. It was infested with *G. pallidipes* throughout the riverine bush and the smaller subsidiary valleys. The results show that this species of tsetse-fly can be controlled without clearing all the bush, but some clearing in the preferred habitats is necessary. Traps and teams of fly-boys with screens and nets will reduce the population, and if isolation from sources of re-infestation is secured, reduction is much more rapid. The destruction of undergrowth alone in a narrow strip does not prevent dispersal; but a strip a thousand yards in width

completely devoid of bush and trees is efficient in protecting an isolated area from reinfestation. Thinning out the thickets adjoining a protective barrier still further reduces the tendency to cross the open space. An extension of this form of discriminative clearing will produce a concentration of the tsetse-fly, which may then be attacked by extensive trapping and patrols. In the Lambwe Valley the breeding of *G. pallidipes* is restricted to the riverine bush. Its eradication from this habitat releases large areas of the adjoining country for profitable agriculture. Experiments were made with many designs of tsetse-fly traps; those which gave promising results were Harris's; Swynnerton's single screen type with awnings and buttocks; Blunt's box screen; and Langridge's collapsible trap. To obtain a relatively quick result, numerous traps are required and these need frequent repairs and renewal. The subject of traps and trapping will be more fully dealt with in a later paper. Here the author records that a trap catches more *G. pallidipes* when it is new than after it has been exposed for some time. The numbers increase again if the old trap is replaced by a new one, and traps bleached in the sun before setting in an infested area do not show this large initial catch. It is extremely doubtful if traps will effect the extermination of residual small numbers of flies. The selection and preparation of good sites for traps require expert advice, based on accurate information from local surveys. When the infestation is naturally low, or has been reduced to a low density, other measures, such as hand-catching by boys with hessian screens, are necessary. The author emphasizes that the permanent haunts of *G. pallidipes* are usually far smaller than the area which is rendered uninhabitable to stock by periodic dispersal of the flies. There is, moreover, a constant danger of permanent extension of the fly belt, so that even where actual reclamation cannot be undertaken, protective measures, such as the establishment of well made barrier clearings, will at least prevent the invasion of more territory. There are also natural conditions, such as severe drought, heavy rain and floods, which periodically affect the fly adversely. Advantage may be taken of these to initiate control measures and so gain a large advantage at low cost. *V. B. Wigglesworth.*

Printed under the authority of His Majesty's Stationery Office
By The South Essex Recorders, Ltd., Ilford.

(1392) Wt. P/1676/260 1,725 9/42 S.E.R. Ltd. Gp. 432.

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